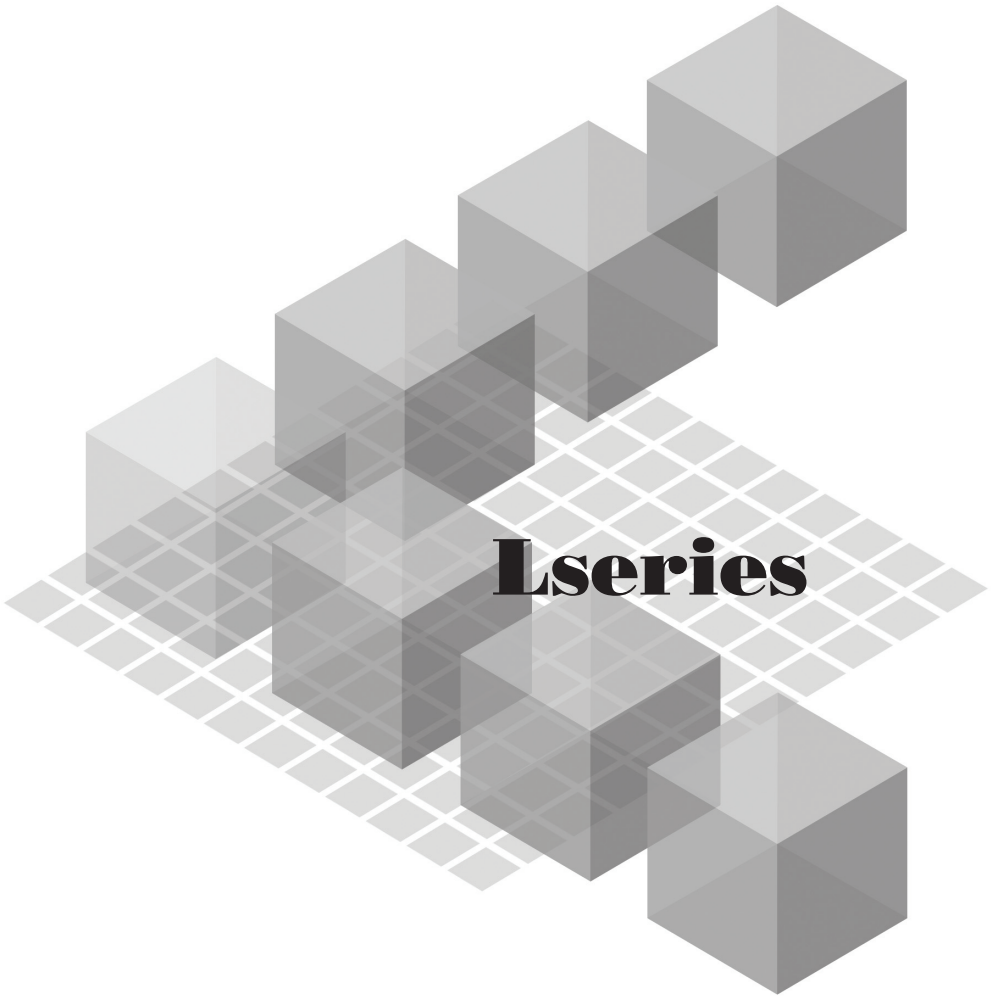
MITSUBISHI

Mitsubishi Programmable Controller

MELSEC *L series*

MELSEC-L SSCNETⅢ/H Head Module User's Manual



MODEL

-LJ72MS15

●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.
  (2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
  - Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
  - Held or turned off according to the parameter setting if the self-diagnostic function of the head module detects an error such as a watchdog timer error.

  Also, all outputs may be turned on if an error occurs in a part, such as an I/O control part, where the head module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to Page 132, Appendix 9.
  (3) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.

[Design Precautions]

⚠WARNING

- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
- Configure a circuit so that the external power supply is turned off first and then the programmable controller. If the programmable controller is turned off first, an accident may occur due to an incorrect output or malfunction.
- For the operating status of each station after a communication failure, refer to relevant manuals for each network. Incorrect output or malfunction due to a communication failure may result in an accident.
- When connecting a peripheral with the head module or connecting an external device, such as a personal computer, with an intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program of the Motion controller to ensure that the entire system will always operate safely.
  For other controls to a running programmable controller (such as program modification of the Motion controller or operating status change), read relevant manuals carefully and ensure the safety before the operation. Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program of the Motion controller, and determine corrective actions to be taken between the external device and head module in case of a communication failure.
- The optical transmitter and receiver of the head module use laser diodes (class 1 in accordance with IEC 60825-1). Do not look directly at a laser beam. Doing so may harm your eyes.

[Design Precautions]

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
- After the head module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration and/or parameter settings. Design circuits so that the entire system will always operate safely, regardless of the time.

[Installation Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Installation Precautions]

⚠CAUTION

- Use the head module in an environment that meets the general specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To interconnect modules, engage the respective connectors and securely lock the module joint levers until they click. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when a terminal block screw comes loose, resulting in failure.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal block screws within the specified torque range. Undertightening can cause short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Mitsubishi programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring methods, refer to the MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal block screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- Before performing online operations (especially, program modification of the Motion controller, forced output, and operation status change) for the running head module from the peripheral device connected, read relevant manuals carefully and ensure the safety. Improper operation may damage machines or cause accidents.
- Do not disassemble or modify the module. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may cause the module to fail or malfunction.
- Tighten the terminal block screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product (module and terminal block), do not connect/disconnect the product more than 50 times (in accordance with IEC 61131-2). Exceeding the limit may cause malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.

●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC-L series programmable controllers.
This manual describes the operating procedure, system configuration, parameter setting, functions, and troubleshooting of the SSCNET III/H head module (hereafter abbreviated as head module).
Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC-L series programmable controller to handle the product correctly.

RELEVANT MANUALS

(1) Motion controller relevant manuals

For Motion controllers, refer to the following.

Manual name <manual number (model code)>	Description
Q173D(S)CPU/Q172D(S)CPU Motion controller User's Manual <IB-0300133, 1XB927>	Specifications of the Motion CPU modules, Q172DLX servo external signal interface module, Q172DEX synchronous encoder interface module, Q173DPX manual pulse generator interface module, power supply modules, servo amplifiers, SSCNET III cables, and serial absolute synchronous encoder cables
Q170MSCPU Motion controller User's Manual <IB-0300212, 1XB962>	Specifications of the Q170MSCPU Motion controller, Q172DLX servo external signal interface module, Q173DPX manual pulse generator interface module, servo amplifiers, and SSCNET III cables; system maintenance and inspection; and troubleshooting
Q173D(S)CPU/Q172D(S)CPU Motion controller Programming Manual (COMMON) <IB-0300134, 1XB928>	Multiple CPU system configuration, performance specifications, common parameters, auxiliary and applied functions, and error lists
Q173D(S)CPU/Q172D(S)CPU Motion controller (SV13/SV22) Programming Manual (Motion SFC) <IB-0300135, 1XB929>	Functions, programming, debugging, and error lists of Motion SFC programs

(2) Operating manual

Manual name <manual number (model code)>	Description
GX Works2 Version 1 Operating Manual (Common) <SH-080779ENG, 13JU63>	System configuration, parameter settings, and online operations of GX Works2, which are common to Simple projects and Structured projects

Memo

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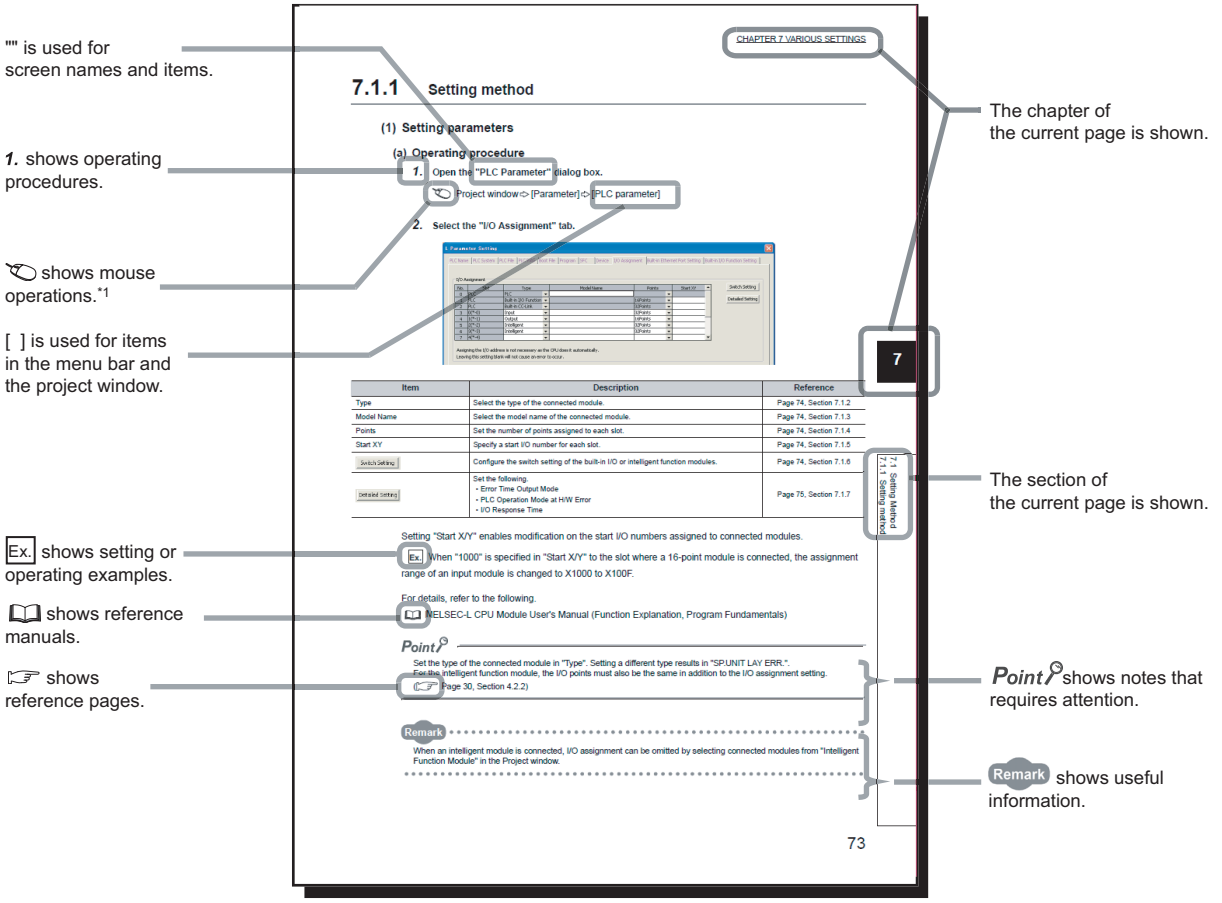
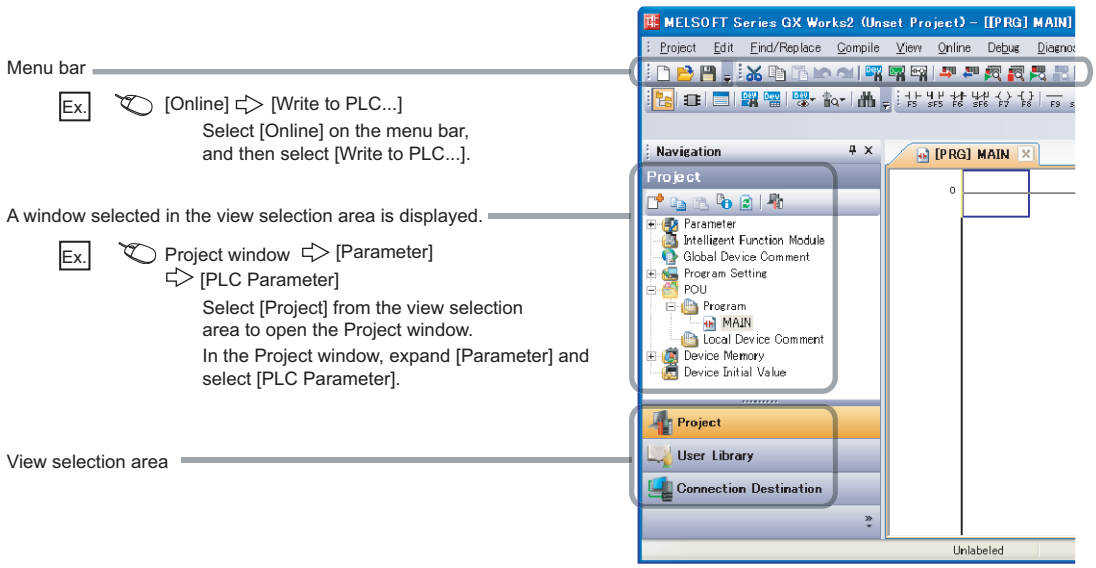
MANUAL PAGE ORGANIZATION

In this manual, pages are organized and the symbols are used as shown below.

The following illustration is for explanation purpose only, and should not be referred to as an actual documentation.


"" is used for screen names and items.
1. shows operating procedures.
shows mouse operations.*1
[ ] is used for items in the menu bar and the project window.
Ex. shows setting or operating examples.
shows reference manuals.
shows reference pages.
CHAPTER 7 VARIOUS SETTINGS
7.1.1 Setting method
(1) Setting parameters
(a) Operating procedure
1. Open the "PLC Parameter" dialog box.
Project window⇨[Parameter]⇨[PLC parameter]
2. Select the "I/O Assignment" tab.
7
Item
Description
Reference
Type
Model Name
Points
Start XY
Switch Setting
Detailed Setting
Setting "Start X/Y" enables modification on the start I/O numbers assigned to connected modules.
When "1000" is specified in "Start X/Y" to the slot where a 16-point module is connected, the assignment range of an input module is changed to X1000 to X100F.
For details, refer to the following.
MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)
Point
Page 30, Section 4.2.2)
Remark
When an intelligent module is connected, I/O assignment can be omitted by selecting connected modules from "Intelligent Function Module" in the Project window.
73
The chapter of the current page is shown.
The section of the current page is shown.
Point shows notes that requires attention.
Remark shows useful information.

*1 The mouse operation example (for GX Works2) is provided below.


Menu bar
Ex. [Online] ⇨ [Write to PLC...]
Select [Online] on the menu bar, and then select [Write to PLC...].
A window selected in the view selection area is displayed.
Ex. Project window ⇨ [Parameter] ⇨ [PLC Parameter]
Select [Project] from the view selection area to open the Project window.
In the Project window, expand [Parameter] and select [PLC Parameter].
View selection area
MELSOFT Series GX Works2 (Unset Project) - [[PRG] MAIN]
Project Edit Find/Replace Compile View Online Debug Diagnos
Navigation
[PRG] MAIN
Project
Parameter
Intelligent Function Module
Global Device Comment
Program Setting
POU
Program
MAIN
Local Device Comment
Device Memory
Device Initial Value
Project
User Library
Connection Destination
Unlabeled

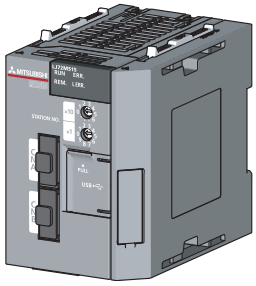
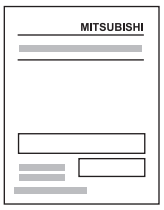
TERM

Unless otherwise specified, this manual uses the following terms.

Term	Description
Buffer memory	A memory in an intelligent function module, where data (such as setting values and monitoring values) are stored
Cyclic transmission	A function by which data are periodically exchanged among stations on the same network using link devices (RX, RY, RWw, and RWr)
Data link	A generic term for cyclic transmission and transient transmission
Dedicated instruction	An instruction that simplifies programming for using functions of intelligent function modules
Device	A device (X, Y, W, or others) in a head module
Disconnection	A process of stopping data link if a data link error occurs
GX Works2	The product name of the software package for the MELSEC programmable controllers
Head module	The abbreviation for the LJ72MS15 SSCNET III/H head module
Intelligent function module	A MELSEC-Q/L series module that has functions other than input and output, such as an A/D converter module and D/A converter module
Link device	A device (RX, RY, RWr, or RWw) in a head module
Link special register (SW)	Word data that indicates the operating status and data link status of a head module
Link special relay (SB)	Bit data that indicates the operating status and data link status of a head module
Motion controller	A generic term for the Q173DSCPU/Q172DSCPU Motion CPU module and Q170MSCPU Motion controller
MT Developer2	The product name of the MELSOFT programming software package for the Motion controllers
Parameter memory	A flash ROM in a head module, where the parameters of the head module are stored
RAS	The abbreviation for Reliability, Availability, and Serviceability. This term refers to usability of automated equipment.
Remote input (RX)	Bit data input from a head module to a Motion controller
Remote output (RY)	Bit data output from a Motion controller to a head module
Remote register (RWr)	Word data input from a head module to a Motion controller
Remote register (RWw)	Word data output from a Motion controller to a head module
Return	A process of restarting data link when a station recovers from an error
SSCNET III/H	One of the high-speed synchronous networks between a Motion controller and a servo amplifier
Transient transmission	A function that enables a Motion controller to access a head module by using dedicated instructions

PACKING LIST

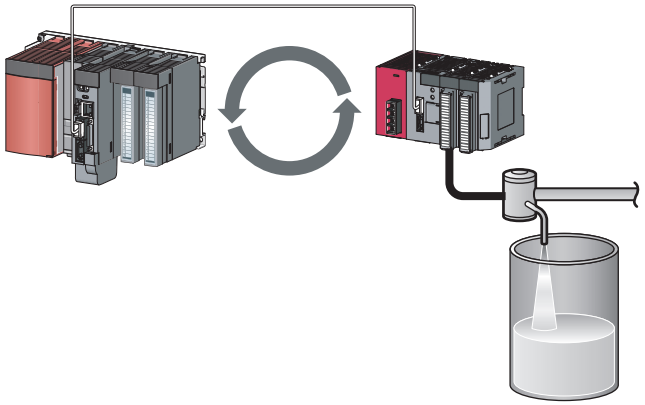
The following items are included in the package of this product. Before use, check that all the items are included.

LJ72MS15	
	
Head module (LJ72GF15-T2) + END cover (L6EC)	Safety Guidelines (IB-0800494)

Memo

CHAPTER 1 HEAD MODULE

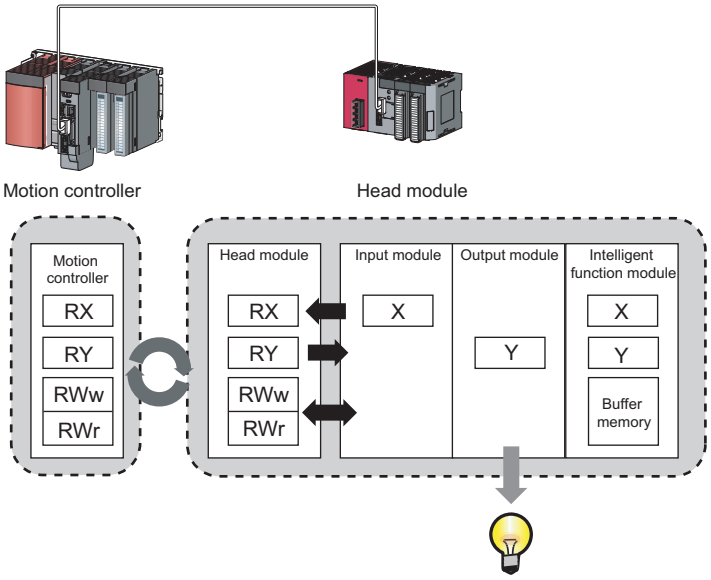
The head module can connect MELSEC-L series I/O modules and intelligent function modules on SSCNET III/H. The head module makes it possible to integrate systems into a single system as remote I/O modules and intelligent function modules for a different system network can be configured. This leads to wire-saving and space-saving of the system.



(1) Cyclic transmission

The I/O signals of a module connected to the head module can operate as those of the Motion controller. (☞ Page 64, CHAPTER 8)

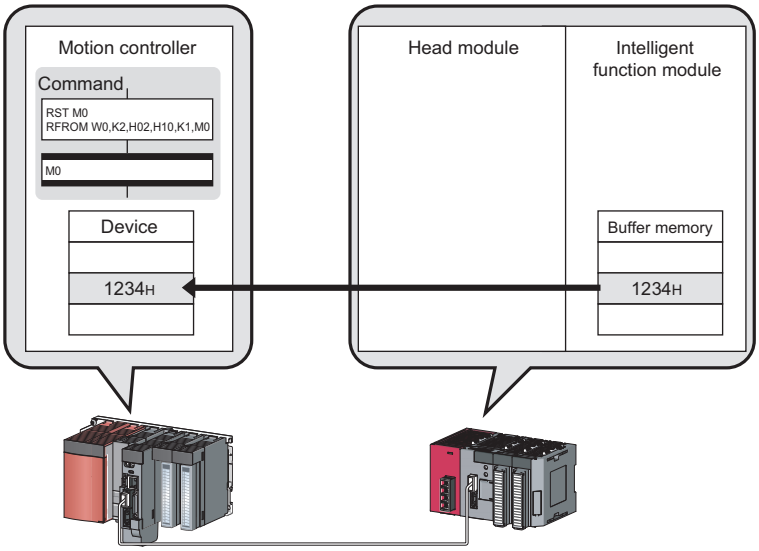
For example, when the output (Y) of the Motion controller is turned on, the output (Y) of a module connected to the head module turns on.



(2) Transient transmission

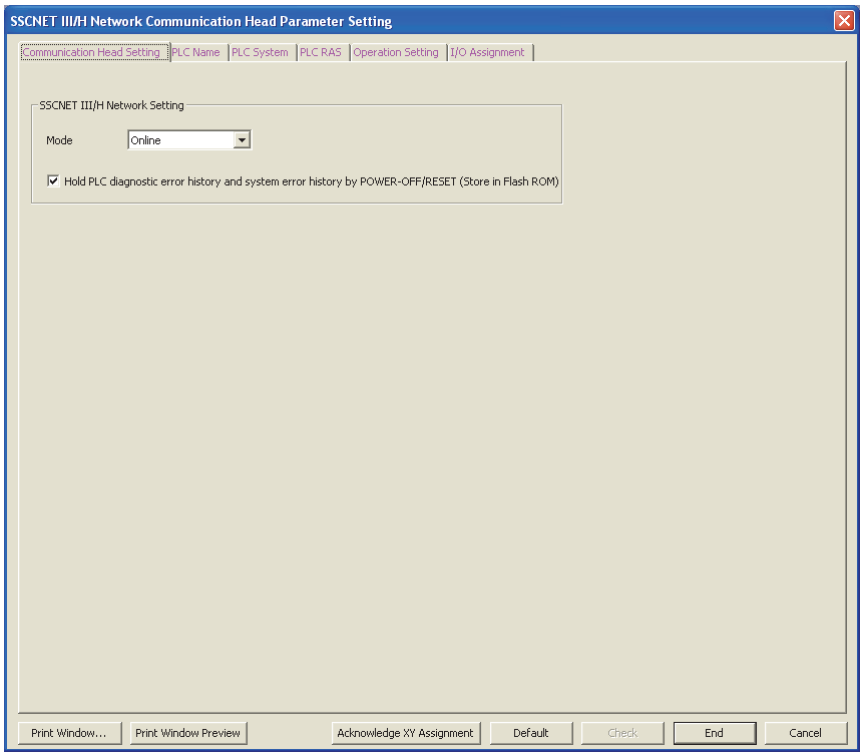
The Motion controller can directly access the buffer memory of an intelligent function module connected to the head module by transient transmission.

The Motion controller sends requests to the head module with dedicated instructions (📖 Programming Manual (Motion SFC) for the Motion controller used).



(3) Setting parameters

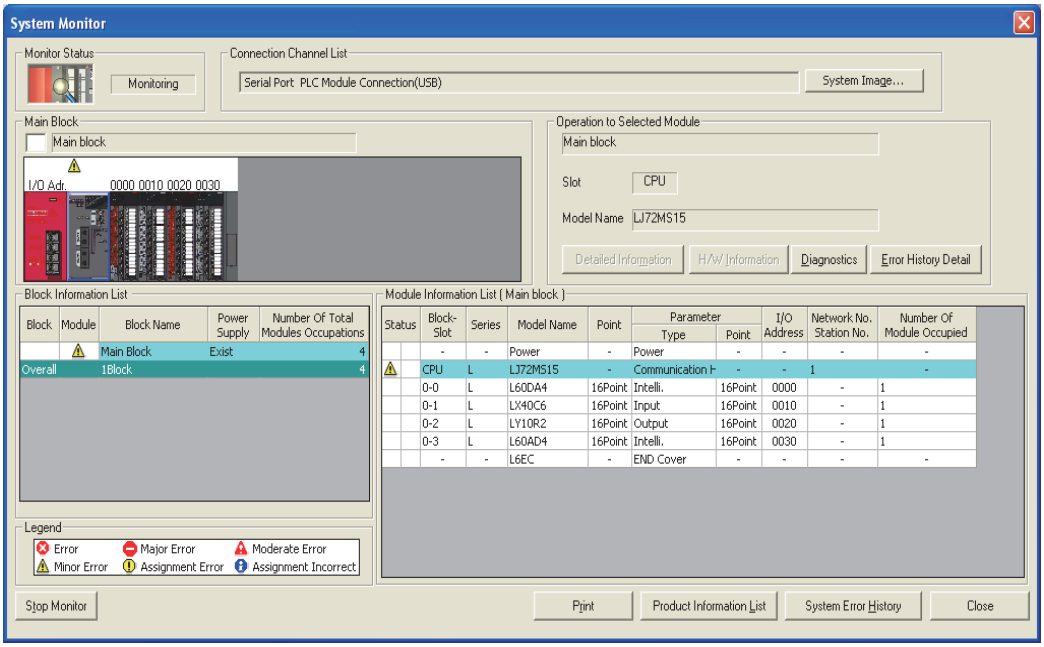
Parameters for the head module can be set using software, GX Works2. Creating parameter setting programs is not required. (☞ Page 52, CHAPTER 7)



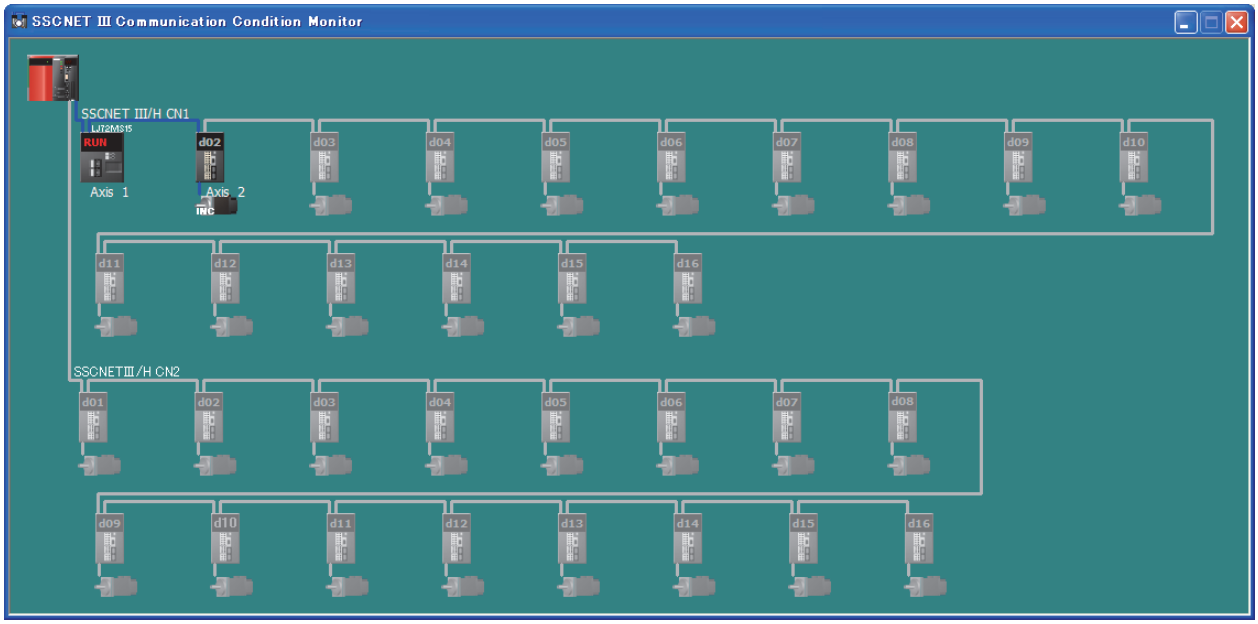
(4) Diagnostics

GX Works2 and MT Developer2 facilitate diagnosing the head module and connected modules. (☞ Page 76, CHAPTER 9, Page 82, Section 11.2)

(a) System Monitor (GX Works2)



(b) SSCNET III Communication Condition Monitor (MT Developer2)



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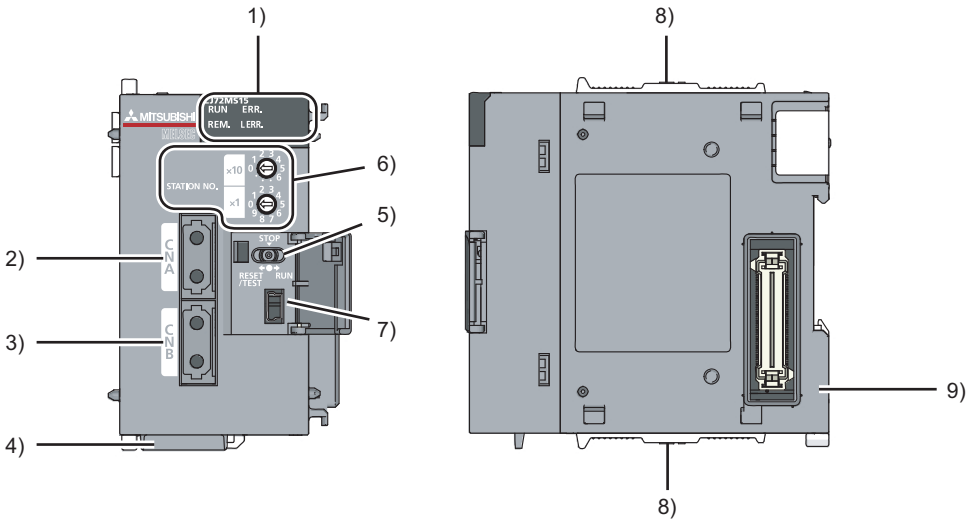
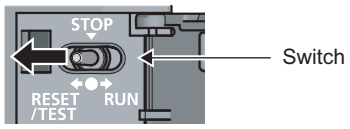
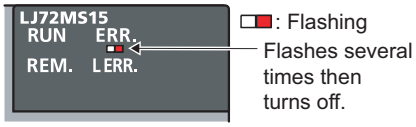
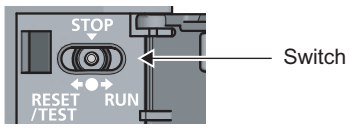
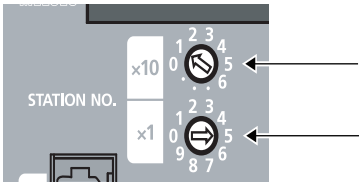
CHAPTER 2 PART NAMES

This chapter describes each part and name of the head module.



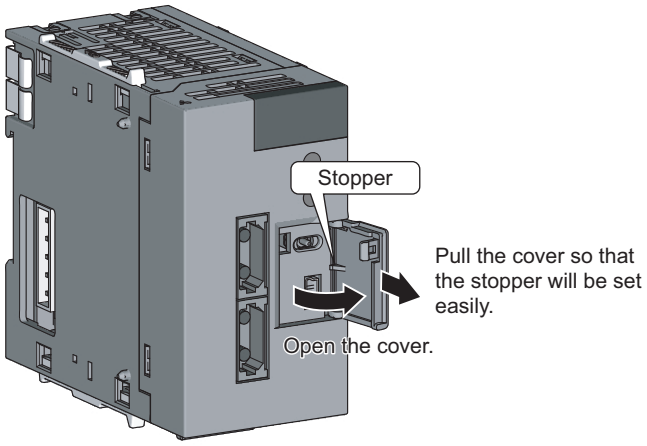
No.	Name		Description
1)	RUN LED	—	Indicates the operating status.
		On	Operating normally (RUN status)
		Flashing	Working normally (STOP status) • The switch of the head module has been set to STOP. (Transfer between the devices in the head module is stopped.) • The Motion controller is in the STOP status. (Transfer between the devices in the head module is stopped.) • Accepting a remote STOP request • The head module has stopped due to an error (except a watchdog timer error).
		Off	A hardware failure or a watchdog timer error has occurred.
	REM. LED	—	Indicates the operating status of the own station.
		On	Operating normally
		Flashing	Has not been reset after writing to PLC. Or, forced input/output registration is in progress.
		Off	• The initial data are being processed. • An error has occurred in the own station. • SSCNET III/H disconnection • Offline mode
	ERR. LED	—	Indicates the error status of the head module. The error details can be checked with PLC diagnostics of GX Works2. (☞ Page 82, Section 11.2)
		On	A head module failure or a watchdog timer error has occurred.
		Flashing	A station number setting switch setting error has occurred. (Other than 1 to 64 is set for the station number setting switch.)
		Off	Working normally
	L ERR. LED	—	Indicates the SSCNET III/H communication error status. The error details can be checked with SSCNET III Communication Condition Monitor of MT Developer2. (☞ Page 76, CHAPTER 9)
		On	A communication error has occurred.
		Off	Communicating normally

No.	Name		Description
2)	CNA		SSCNET III cable connector (for the first axis). Connect an SSCNET III cable. (☞ Page 45, Section 6.5.1) Connect the Motion controller, a servo amplifier for the first axis, or the head module of the preceding station.
3)	CNB		SSCNET III cable connector (for the second axis). Connect an SSCNET III cable. (☞ Page 45, Section 6.5.1) Connect a servo amplifier for the second axis or the head module of the following station. If the head module of own station is the last station, cover the connector with a cap.
4)	Serial number display		Displays the serial number printed on the rating plate.
5)	Switch	—	This switch controls the operation of the head module.
		RESET/ TEST	Resets the head module or switches it to test mode. Operate the switch with your fingers. Use of a tool such as a screw driver may damage the switch. • Reset method ***1.*** **Hold the switch in the RESET/TEST position for 1 second or more.** Do not release your hand from the switch while it is in the RESET/TEST position.  ***2.*** **Check that the ERR. LED flashes several times, and turns off.**  ***3.*** **Set the switch to the STOP position.** The switch automatically returns to the STOP position when your hand is released.  • Test procedure: For details of the test mode, refer to the explanation on the test mode. (☞ Page 43, Section 6.4)
		STOP	Stops the data transfer between the link devices of the head module (cyclic data from the Motion controller) and head module devices. (Stops the transfer while performing cyclic transmission with the Motion controller, and stops the output.) Stopping the data transfer stops sending the input/output information of modules, connected to the head module, to the Motion controller. The STOP switch is used when performing a debug operation between modules connected to the head module and external devices. Ex. Debugging between a module and an external device using the STOP switch (1) Set the switch to "STOP". (2) Data transfer is stopped between the link devices of the head module and head module devices and the devices are separated from the Motion controller control. (3) Conduct an input/output test between the module connected to the head module and the external device. Since the data transfer is stopped, the input/output status data are not sent to the Motion controller. (4) When the test is complete, write parameters to the head module and start the system operation.
		RUN	Starts the data transfer between the link devices of the head module (cyclic data from the Motion controller) and head module devices. The output from the Motion controller is output from a module connected to the head module. The input from the module connected to the head module is input to the Motion controller.

No.	Name	Description
6)	Station number setting switch	Rotary switches used to set the station number. Ex. To set the station number to 15, arrange the switches as follows.  • Set the station number within the range from 1 to 64. A set value outside the range causes a station number setting switch error, and the ERR. LED flashes. • Set the station number of the head module so that the station number does not overlap with other head modules' station numbers or servo amplifiers' axis numbers in the same system. (Setting the same number causes a stop error in the Motion controller.)
7)	USB connector	A connector for connecting to GX Works2. (Connector type: miniB)
8)	Module joint levers	Levers for connecting modules each other.
9)	DIN rail hook	A hook used to mount the module to a DIN rail.

Remark

- Opening and closing the front cover of the head module: The cover on the front of the head module is equipped with a stopper. If you open the cover until it clicks, it will stay open.



- LED indication during a unit test: The RUN LED turns on and the REM. LED flashes while a unit test is performed. For the procedure of a unit test, refer to Page 43, Section 6.4.

CHAPTER 3 SPECIFICATIONS

This chapter describes the specifications of the head module.

3.1 General Specifications

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-25 to 75℃</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6" rowspan="2">5 to 95%RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Compliant with JIS B 3502 and IEC 61131-2</td><td></td><td>Frequency</td><td>Constant acceleration</td><td>Half amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>5 to 8.4Hz</td><td>—</td><td>3.5mm</td><td rowspan="2">10 times each in X, Y, and Z directions</td></tr>
<tr><td>8.4 to 150Hz</td><td>9.8m/s^2</td><td>—</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>5 to 8.4Hz</td><td>—</td><td>1.75mm</td><td rowspan="2">—</td></tr>
<tr><td>8.4 to 150Hz</td><td>4.9m/s^2</td><td>—</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Compliant with JIS B 3502 and IEC 61131-2 (147m/s^2, 3 times each in X, Y, and Z directions)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="6">No corrosive gases</td></tr>
<tr><td>Operating altitude*1</td><td colspan="6">0 to 2000m</td></tr>
<tr><td>Installation location</td><td colspan="6">Inside a control panel</td></tr>
<tr><td>Overvoltage category*2</td><td colspan="6">II or less</td></tr>
<tr><td>Pollution degree*3</td><td colspan="6">2 or less</td></tr>
<tr><td>Equipment class</td><td colspan="6">Class I</td></tr>
</table>

*1 Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the programmable controller under pressure, please consult your local Mitsubishi representative.

*2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

*3 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

Point

To make the programmable controller comply with the EMC and Low Voltage Directives, refer to ☞ Page 123, Appendix 8.

3.2 Performance Specifications

Item			Specifications
SSCNET III/H	Maximum link points per network	RWr, RX	256 bytes in total
		RWw, RY	256 bytes in total
	Maximum link points per station	RWr, RX	64 bytes in total
		RWw, RY	64 bytes in total
	Communication speed		150Mbps
	Maximum connectable stations per network[*1]	Communication cycle: 888μs	4 stations
		Communication cycle: 444μs	2 stations
		Communication cycle: 222μs	1 station
	Connection cable		SSCNET III cable (optical fiber cable) (📖 User's manual for the Motion controller used)
	Maximum station-to-station distance		POF type: 20m H-PCF type: 50m
	Connection method		Daisy chain connection (Regenerative relay system with a servo amplifier)
	Transmission system		Full-duplex communication (because of the separation of the channels for sending and receiving)
	Encoding method		8B10B + scramble
	Transmission format		Original to SSCNET III/H
	Synchronization method		Synchronization of the control cycle and communication cycle that synchronize with the data transmission of the Motion controller
	Communication cycle		222μs/444μs/888μs
	Error control system		CRC

Item			Specifications
Head module	Number of I/O points*2	X	4096 points, 512 bytes (Number of points accessible to the actual module)
		Y	4096 points, 512 bytes (Number of points accessible to the actual module)
	Number of device points	X	8192 points, 1KB (Number of usable points on programs) (RY0 is assigned from X0.)
		Y	8192 points, 1KB (Number of usable points on programs) (RY0 is assigned from Y0.)
		SB	8192 points, 1KB
		SW	8192 points, 16KB
		SM	2048 points, 256 bytes
		SD	2048 points, 4KB
		W	8192 points, 16KB (RWw0 is assigned from W0. RWr0 is assigned from W1000.)
		U□□\G□□	Devices that directly access the buffer memory of intelligent function modules (📖 User's manual for the intelligent function module used)
	Number of writes to the parameter memory		Up to 100000 times
	Clock function (for displaying the date and time of an error)		Year, month, date, hour, minute, and second (automatic leap year detection) When connected to a network, the clock synchronizes periodically with the clock in the Motion controller via the network. (Initial value: 2000/1/1 00:00:00) After the clock information has been acquired from the Motion controller, when the head module is powered off then on, the clock resumes from the time when the power was last turned off. (The clock pauses during power off.) Therefore, the data and time of an error that occurred during initial processing may be different from the actual one.
	Allowable momentary power failure time		Depends on the power supply module used.
	Internal current consumption (5VDC)		0.55A
	Laser classification (JIS C 6802, IEC 60825-1)		Class 1
	External dimensions	H	90mm
		W	50mm
		D	95mm
	Weight		0.20kg

*1 This number includes only head modules. Servo amplifiers are not included.

*2 This is the maximum number of points that can be assigned to the actual module in "PLC Parameter" - "I/O Assignment" of GX Works2.

3.3 Function List

The following table lists the functions of the head module.

Function		Description	Reference
Cyclic transmission		The inputs/outputs of modules connected to the head module can be handled just like those of the Motion controller.	Page 64, CHAPTER 8
Transient transmission		The buffer memory of intelligent function modules can be accessed directly from the Motion controller. The Motion controller sends requests to the head module with dedicated instructions.	Programming Manual (Motion SFC) for the Motion controller used
Output mode setting for error		Specifies whether to clear or hold the output to each module when a stop error or a data link error occurs in the head module.	Page 62, Section 7.1 (6)
Operation mode setting for a hardware error		Specifies whether to stop the auto refresh of the head module or not, when a hardware error occurs (when the head module detects SP.UNIT DOWN) in the intelligent function module.	Page 62, Section 7.1 (6)
Diagnostics	System monitor	Diagnostics of the head module and connected modules can be performed using GX Works2.	Page 82, Section 11.2
	SSCNET III Communication Condition Monitor	The connection status of whole SSCNET III/H can be checked using MT Developer2.	Page 76, CHAPTER 9
System error history		The history of errors that occurred in the head module and intelligent function modules can be confirmed on a single screen.	Page 86, Section 11.3
Remote RUN/STOP		Changes the status of the head module to RUN or STOP, without using the switch.	Page 104, Appendix 2
Remote RESET		Resets the head module when it is in the STOP status, without using the switch.	Page 104, Appendix 2
Monitoring/test		The status of the head module devices and the buffer memory of the intelligent function module can be monitored, and current values can be changed in GX Works2. Use one of the following to monitor or change the current value. • Device/buffer memory batch monitor • Watch window • Present value change	GX Works2 operating manual
Forced on/off for external I/O		The external input/output of the head module can be forcibly turned on or off.	Page 100, Appendix 1

Memo

CHAPTER 4 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operating the head module.
For start-up examples, refer to the user's manual for the Motion controller used.

Checkbox

☐ **System consideration**
Consider the system configuration and link device assignment.
☞ Page 31, CHAPTER 5, Page 64, CHAPTER 8

▼

☐ **Installation**
Install the power supply module, head module, I/O module(s), intelligent function module(s), and an END cover.
☞ Page 35, Section 6.1, Page 36, Section 6.2, Page 43, Section 6.3

▼

☐ **Unit test**
Perform unit tests on the head module and intelligent function module(s).
☞ Page 43, Section 6.4

▼

☐ **Connection**
Connect an SSCNET III cable to the head module.
☞ Page 45, Section 6.5

▼

☐ **Configuration**
Set parameters for each module.
☞ Page 52, CHAPTER 7, Page 64, CHAPTER 8

▼

☐ **Starting data link**
Start data link.
☞ Page 20, CHAPTER 2, Page 64, CHAPTER 8

▼

☐

Network diagnostics

Check that communications can be performed normally with the SSCNET III/H communication status monitor.

☞ Page 76, CHAPTER 9

Point

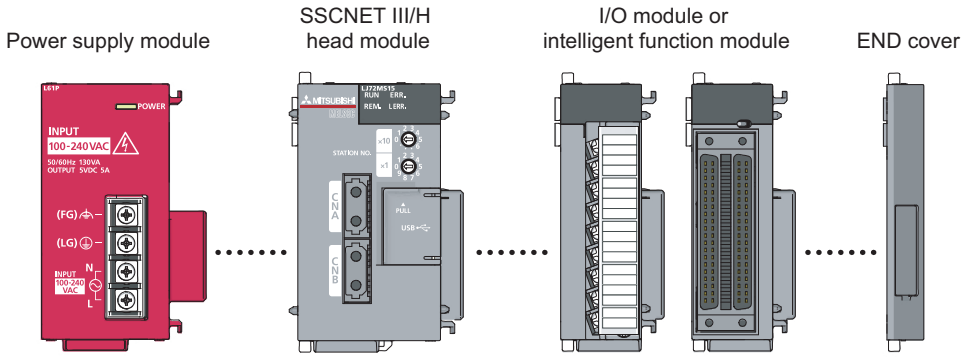
If the head module is powered on when there is no communication with the Motion controller, it takes approximately 5 seconds to change to the RUN status.

CHAPTER 5 SYSTEM CONFIGURATION

This chapter describes system configuration using a head module.
For SSCNET III/H configuration, refer to the following.
User's manual for the Motion controller used

5.1 Head Module System Configuration

The following shows system configuration using a head module.



For power supply modules, refer to the following.
MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)
For I/O modules and intelligent function modules, refer to the manual for the module used.

Point

The MELSEC-L series CPU module cannot be connected to a system using a head module.

5.2 Applicable Systems

(1) Connectable modules and the number of modules

(a) Connectable modules

The following MELSEC-L series modules can be connected to the head module.

- Power supply module
- I/O modules
- Analog-digital converter module
- Digital-analog converter module
- Analog input/output modules*1
- High-speed counter module

*1 Use the head module with a serial number (first five digits) of "15072" or later.

(b) Number of modules

The number of I/O modules and intelligent function modules that can be connected is 10 in total.*1*2

*1 The number of modules is exclusive of the number of power supply modules and END covers.

*2 For some intelligent function modules, one module occupies a space by two modules. For the occupied space, refer to the user's manual for the module used before configuring a system.

Some modules have restrictions on the number of modules. The following table shows the relevant models and the number of modules.

Module	Model name	Number of modules
Head module	LJ72MS15	1

(2) Modules/unit that cannot be connected

The CPU module and the following module/unit cannot be connected to the head module.

Module/unit	Model name
Branch module	L6EXB
Extension module	L6EXE
RS-232 adapter	L6ADP-R2
Display unit	L6DSPU
Positioning module	LD75P1, LD75D1, LD75P2, LD75D2, LD75P4, LD75D4
Temperature control module	L60TCTT4, L60TCTT4BW, L60TCRT4, L60TCRT4BW
Simple motion module	LD77MH4, LD77MH16
Serial communication module	LJ71C24, LJ71C24-R2
CC-Link IE Field Network master/local module	LJ71GF11-T2
CC-Link IE Field Network head module	LJ72GF15-T2
CC-Link master/local module	LJ61BT11
CC-Link/LT master module	LJ61CL12
Ethernet interface module	LJ71E71-100
AnyWireASLINK master module	LJ51AW12AL

(3) Motion controller

The SSCNET III/H-compatible motion CPU and the stand-alone Motion controller are compatible.

Module/unit	Model name
Motion CPU	Q172DSCPU
	Q173DSCPU
Stand-alone Motion controller	Q170MSCPU

To connect the head module to the Motion controller, set the communication type*1 of the Motion controller to "SSCNET III/H". ("SSCNET III" is not available.)

*1 Set with "SSCNET Setting" in "Basic Setting" of MT Developer2.

(4) Software package

GX Works2 and MT Developer2 are required for setting and diagnosing the head module.
GX Developer is not available.

Software	Version
GX Works2	Version 1.98C or later
MT Developer2	Version 1.56J or later

(5) Precautions for system configuration

(a) Rated output current (5VDC)

Configure a system so that the total current consumption may not exceed 5VDC, rated output current of the power supply module.

For specifications of the power supply module, refer to the following.

MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

Memo

CHAPTER 6 INSTALLATION AND WIRING

This chapter describes the installation and wiring of modules.

6.1 Wiring Environment and Installation Position

When installing the module in a control panel, fully consider its operability, maintainability, and environmental resistance.

6.1.1 Installation environment

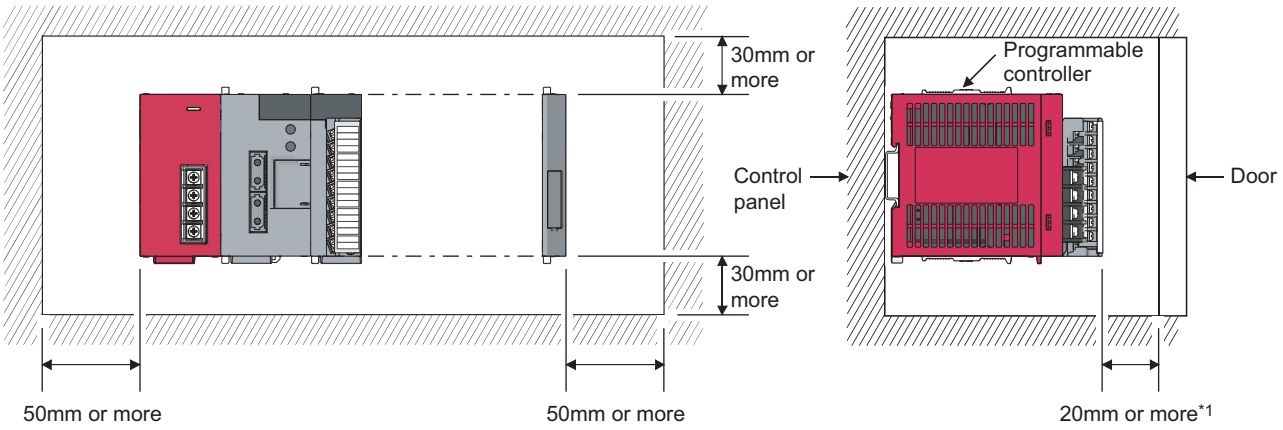
Install the programmable controller according to the installation environment shown in the general specifications. (☞ Page 24, Section 3.1)

Do not install the programmable controller to the place where:

- Ambient temperature is outside the range of 0 to 55℃;
- Ambient humidity is outside the range of 5 to 95%RH;
- Condensation occurs due to rapid temperature change;
- Corrosive gas or combustible gas is present;
- Conductive powder such as dust and iron powder, oil mist, salinity, or organic solvent is filled;
- The programmable controller is exposed to direct sunlight;
- A strong electric field or strong magnetic field is generated; and
- The programmable controller is subject to vibration and shock.

6.1.2 Installation position

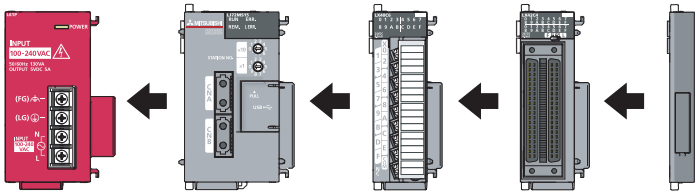
To ensure good ventilation and ease module change, provide clearance between the module top/bottom and structures/parts as shown below.



*1 When using connectors for external devices, provide clearance of 80mm or more.

6.2 Installation

This section describes how to interconnect modules and how to mount them on a DIN rail.



Point

- Modules must be mounted on a DIN rail.
- Connect an END cover on the right of the terminal module.

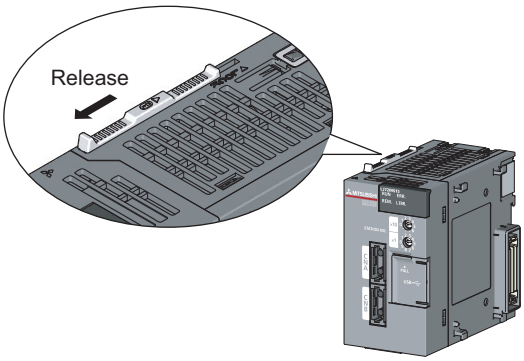
(1) Precautions for connecting and mounting modules

- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.
- The number of times the module can be connected/disconnected is limited to 50 times. (In accordance with IEC 61131-2) Exceeding this limit may cause malfunction.
- Do not drop or apply strong shock to the module case.
- Do not remove the printed-circuit board of the module from the case. Doing so may cause failure of the module and/or printed-circuit board.

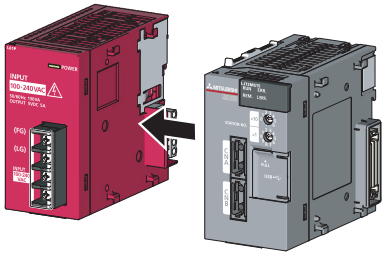
6.2.1 Connecting modules

This section describes the procedure for connecting modules.
An example will show how a head module is connected to the L61P.
Shut off the external power supply for the system in all phases before connecting or disconnecting modules.

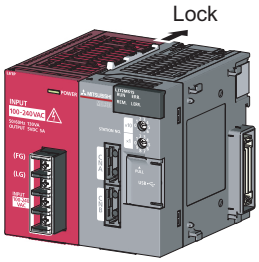
(1) Connecting modules



1. **To release the module joint levers located at the top and bottom of the head module:**
Slide the levers toward the front side of the module until they click.



2. **Insert the connector of the power supply module into that of the head module so that they are securely engaged.**



3. **To lock the module joint levers:**
Slide the levers toward the back side of the module until they click.
Make sure that the modules are securely connected.

(2) Disconnecting modules

Disconnect the modules by reversing the procedure above.

Point

- Failure to securely lock the module joint levers until they click may cause malfunction, failure, or drop of the module.
- The metal on the back of the module may be at a high temperature immediately after the module is powered off. Take care to prevent a burn at module disconnection.

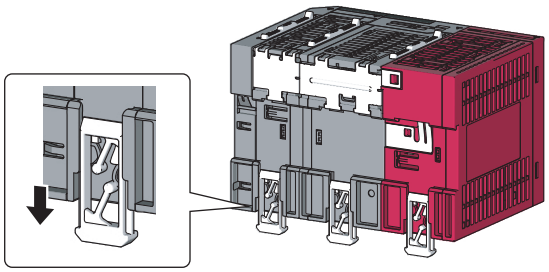
6.2.2 Mounting the modules on a DIN rail

This section describes a procedure for mounting the modules on a DIN rail.

Point

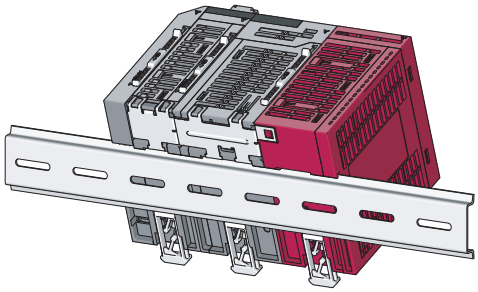
An example of the use of the DIN rail stopper is described in the following procedure. Fix the module according to the manual of the DIN rail stopper used.

(1) Mounting procedure

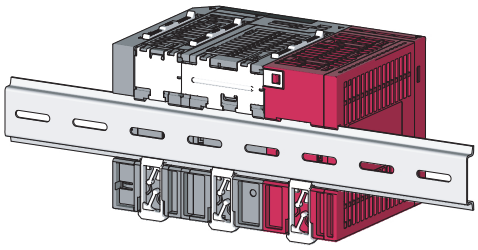


1. **Pull down all DIN rail hooks on the back of the modules.**

The levers should be pulled down until you hear them click.



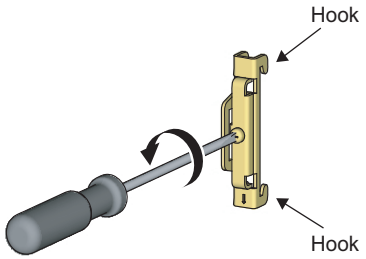
2. **Hang the upper tabs of the modules on a DIN rail, and push the modules in position.**



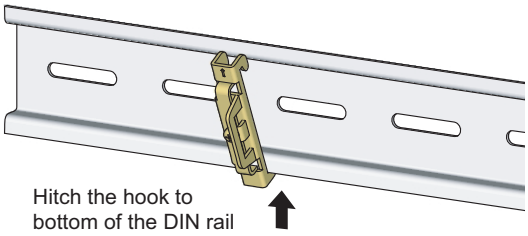
3. **Lock the DIN rail hooks to the DIN rail to secure the modules in position.**

Push each hook up until you hear it click.

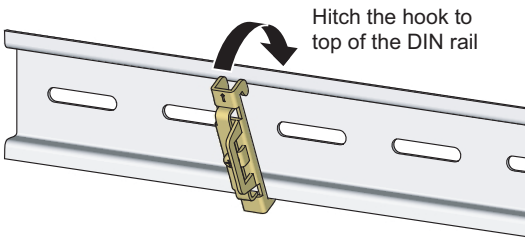
If the hooks are beyond the reach, use a tool such as a screw driver.



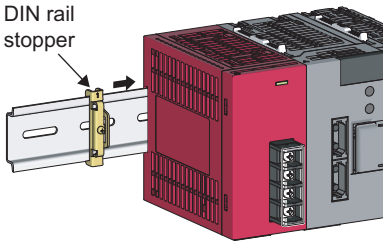
4. **Loosen the screw on DIN rail stopper.**



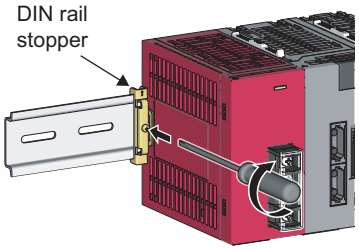
5. **Hitch the bottom hook of the DIN rail stopper to the bottom of the DIN rail.**
Hitch the hook according to the orientation of the arrow on the front of the stopper.



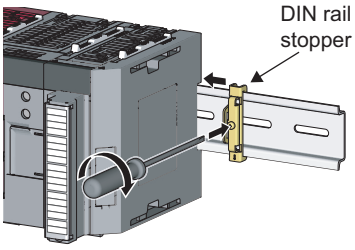
6. **Hitch the upper hook of the DIN rail stopper to the top of the DIN rail.**



7. **Slide the DIN rail stopper up to the left side of the modules.**



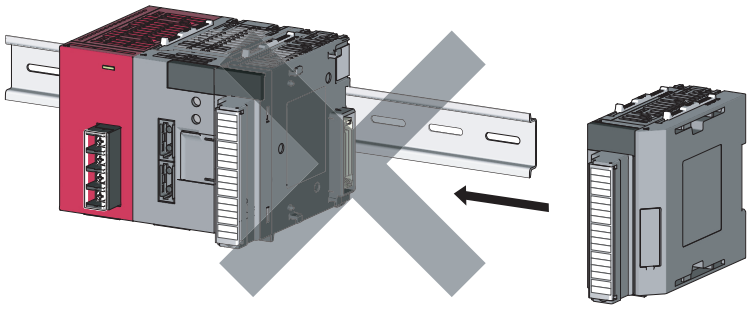
8. **Hold the DIN rail stopper in the direction opposite to the arrow on the stopper and tighten the screw with a screw driver.**



9. **Attach a DIN rail stopper on the right of the modules with the same procedure.**
Install the stopper upside down for the right side.

Point

Do not slide modules from the edge of the DIN rail when mounting them. Doing so may damage the metal part located on the back of the module.



(2) Removal procedure

Remove the modules from the DIN rail by reversing the above procedure.

(3) Applicable DIN rail model (IEC 60715)

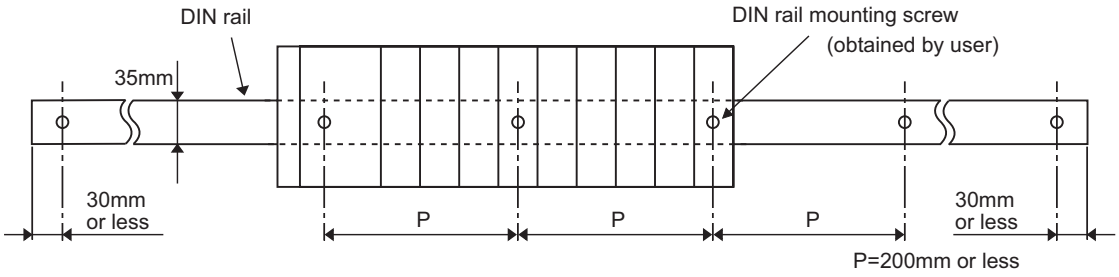
- TH35-7.5Fe
- TH35-7.5Al
- TH35-15Fe

(4) DIN rail stopper

Use a stopper that is attachable to the DIN rail.

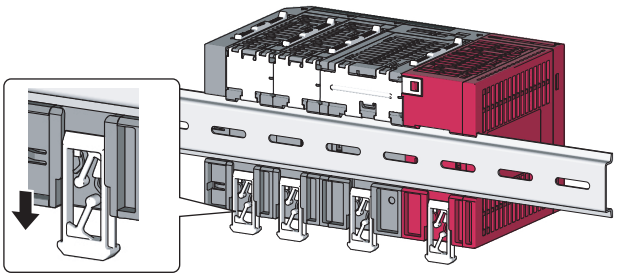
(5) Interval between DIN rail mounting screws

To ensure the strength of a DIN rail, tighten DIN rail mounting screws (obtained by user) within 30mm away from the both edges of the DIN rail and at 200mm-interval between the screws.



6.2.3 Changing modules on a DIN rail

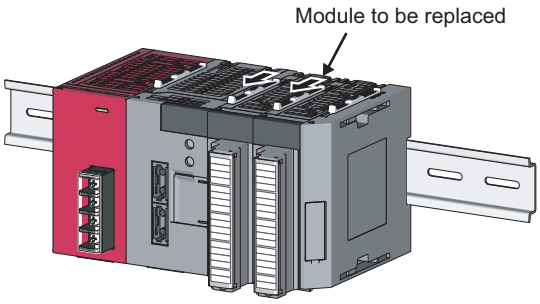
This section describes a procedure for changing modules on a DIN rail by sliding them rightward.
Remove the mounted terminal block and disconnect the connectors beforehand.



1. **Remove the DIN rail stopper on the right edge.**

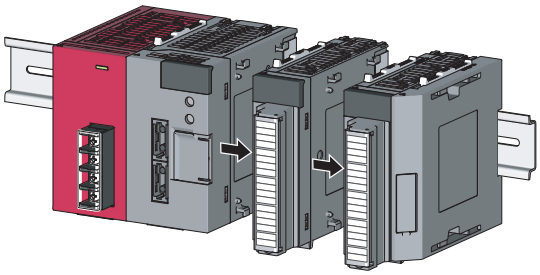
2. **Pull down DIN rail hooks on the back of the modules.**

Pull down the DIN rail hooks on the module to be changed and the module on its right, until you hear them click.
If the hooks are beyond the reach, use a tool such as a screw driver.

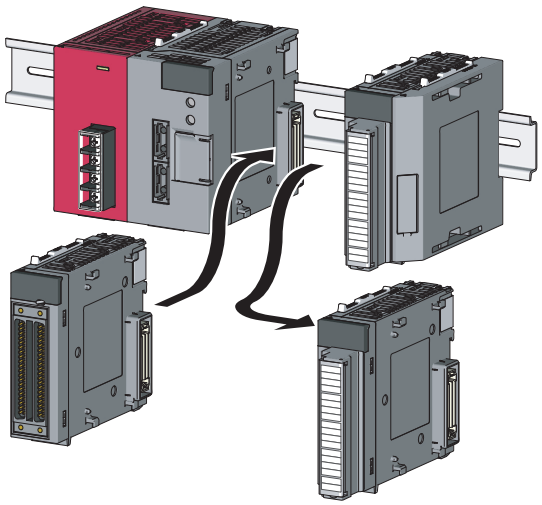


3. **Release the module joint levers on the modules.**

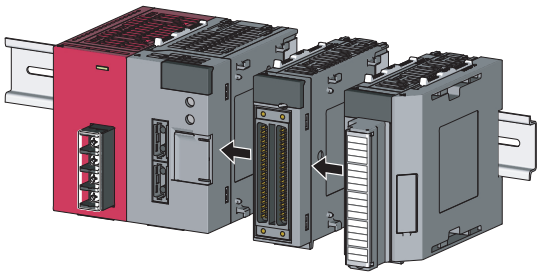
Slide the module joint levers on the module to be changed and on the module on the right of the changed module toward the front side of the module until they click.



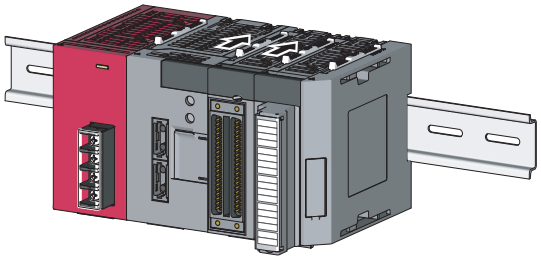
4. **Disconnect the modules by sliding them individually.**



5. **Change the modules.**



6. **Slide the modules and plug the connectors.**



7. **Lock the module joint levers.**

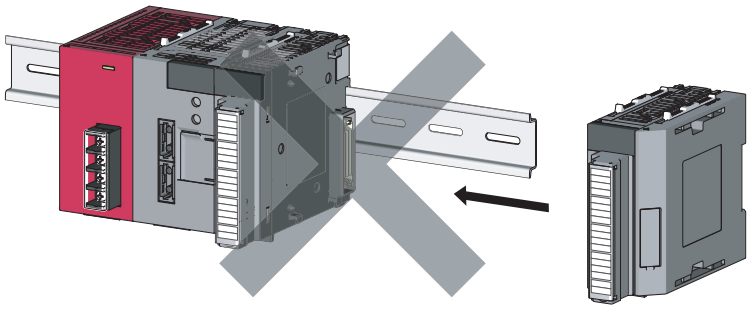
Slide the levers toward the back side of the module until they click.

8. **Lock the DIN rail hooks and attach the DIN rail stopper.**

(☞ Page 38, Section 6.2.2)

Point

Do not slide modules from the edge of the DIN rail when mounting them. Doing so may damage the metal part located on the back of the module.



6.3 Wiring to the Power Supply Modules

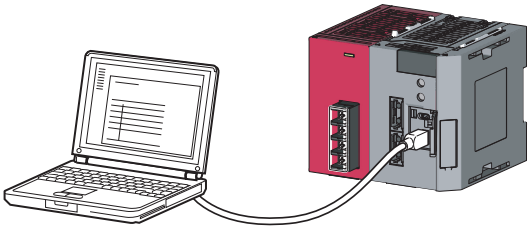
For information on wiring to the power supply modules, refer to the following.

MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

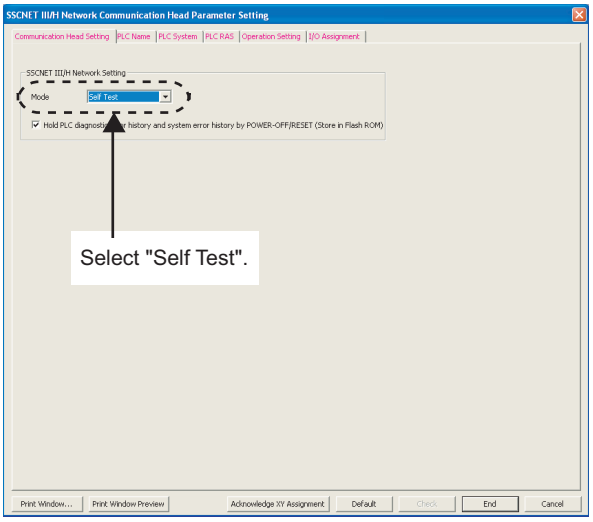
6.4 Testing the Head Module Before Wiring

(1) Unit test

Run a unit test to check if there is any abnormality in the head module hardware.

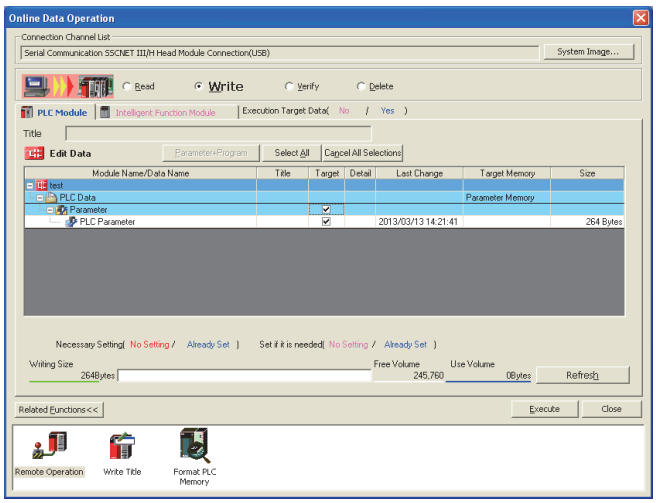


1. **Connect the modules as shown left. Connect the head module to GX Works2.**



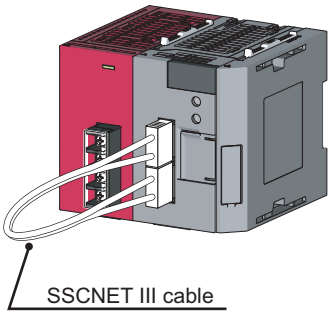
2. **Set the PLC parameter in GX Works2 as shown left.**

Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "Communication Head Setting"

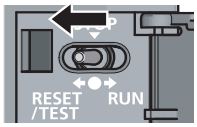


3. **Write the PLC parameter set in GX Works2 to the head module.**

[Online] ⇨ [Write to PLC...]

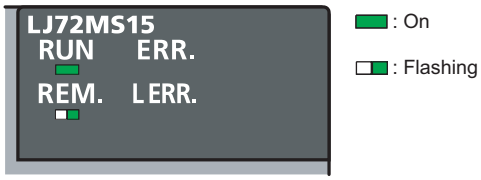


4. **Connect the CNA connector and the CNB connector of the head module with an SSCNET III cable.**



or power off and on

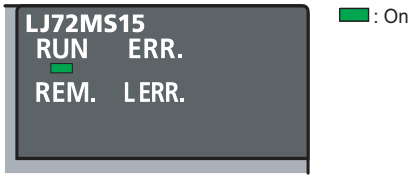
5. **Reset the head module or turn off and on the power supply.**



6. **Unit test begins.**

The RUN LED turns on and the REM. LED flashes.

When completed



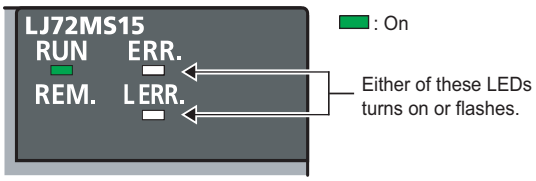
7. **The REM. LED turns off when the test is completed.**

· When completed: The REM. LED turns off while the ERR. LED and the L ERR. LED remain off.

· When failed: The REM. LED turns off and either the ERR. LED or the L ERR. LED turns on or flashes.

If the test fails, replace the SSCNET III cable and conduct the test again. If the test fails again, it may be due to a hardware failure in the head module. Please consult your local Mitsubishi representative.

When failed



6.5 Wiring to the Head Module

This section describes the wiring to the head module.

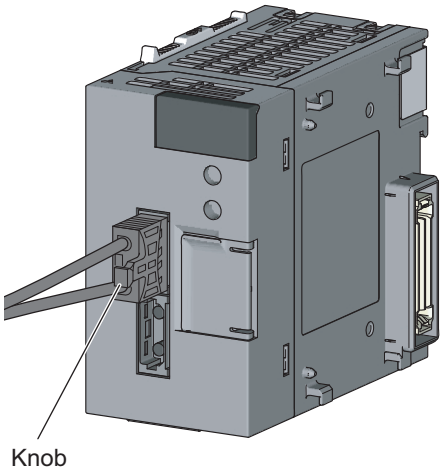
6.5.1 Wiring

This section describes SSCNET III cable wiring and precautions. For network configuration and cables for wiring, refer to the following.

User's manual for the Motion controller used

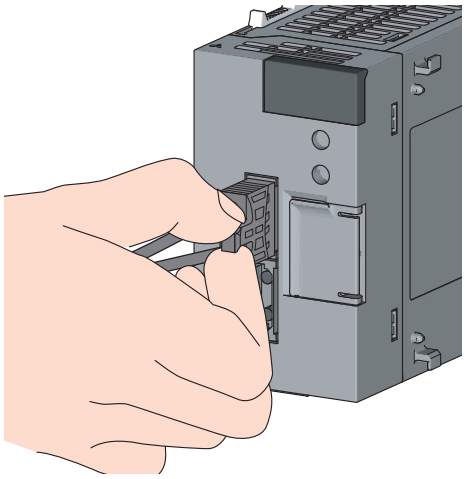
(1) Connecting an SSCNET III cable

(a) Connecting the cable



1. **Power off the target device to be connected and the head module.**
2. **Connect an SSCNET III cable, which is to be connected to the Motion controller, the first axis, or the preceding station, to CNA.**
   Connect the SSCNET III cable to CNA holding the knob of the cable connector. Securely insert the cable until it clicks.
3. **Connect an SSCNET III cable, which is to be connected to the second axis or the following station, to CNB.**
4. **Power on the head module.**
5. **Power on the external devices connected to CNA and CNB of the head module.**

(b) Disconnecting the cable

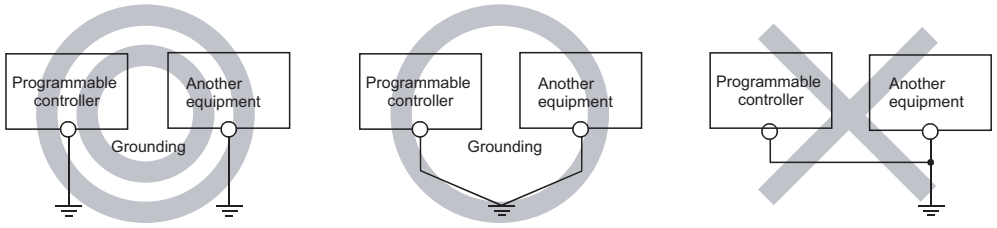


1. **Power off the external devices connected to the head module, and the head module.**
2. **Disconnect the SSCNET III cable holding the knob of the cable connector.**

6.5.2 Grounding

Observe the following:

- Provide independent grounding when possible. Ground the FG and LG terminals to the protective ground conductor dedicated to the programmable controller.
- If independent grounding cannot be provided, employ (2) Shared grounding shown below.



(1) Independent grounding····· Best (2) Common grounding····· Good (3) Joint grounding·····Not allowed

- Use thick cables up to 2㎟. Bring the grounding point close to the programmable controller as much as possible so that the ground cable can be shortened.

6.5.3 Precautions

This section describes wiring precautions.

(1) Precautions for handling the SSCNET III cable

- Do not step on the SSCNET III cable.
- When laying the SSCNET III cable, keep the minimum or a larger cable bend radius. If the bend radius is smaller than the minimum cable bend radius, it may cause malfunctions due to characteristic degradation or a wire break.
- When installing or removing the SSCNET III cable, hold the knob of the cable connector.

(2) Connecting the SSCNET III cable

- When connecting the SSCNET III cable to the head module, connect the SSCNET III cable to CNA and CNB of the head module, holding the knob of the SSCNET III cable connector. Securely insert the cable until it clicks.
- If the end faces of the SSCNET III cable are covered with dirt, optical transmission is interrupted and a malfunction may occurs. Wipe the dirt with a nonwoven fabric. Do not use a solvent such as alcohol.

(3) Disconnecting the SSCNET III cable

- When disconnecting the SSCNET III cable, hold the knob of the SSCNET III cable connector then pull it out.
- After disconnecting the SSCNET III cable, put the cap, attached to the head module, to the head module.
- Cover the end faces with protection tubes for optical cord's end faces.

(4) Precautions for wiring the SSCNET III cable

The SSCNET III cable uses optical fibers. If a severe impact, lateral pressure, a hard pull, sudden bending, or a twist is exerted on the optical fibers, its inside distorts or breaks, and optical transmission may become unavailable. Especially, MR-J3BUS□M and MR-J3BUS□M-A are made of synthetic resin, it melts if left near fire or a high temperature.

Therefore, do not let the fibers come into contact with a part having a high temperature during operation, such as the radiator and the regenerative option of a servo amplifier, and a servo motor.

Use the optical fibers within the range of the operating temperature described in the manual for the Motion controller used. Read this section carefully and handle the fibers with caution.

(a) Minimum bend radius

Lay the cables keeping the minimum or a larger bend radius. Do not press the cable against edges of equipment or other pointed objects. Keep an appropriate length for the SSCNET III cable with the consideration for the dimensions and arrangement of the head module, so that the cable keeps at least the minimum bend radius when laid. When closing the door of a control panel, secure the SSCNET III cable against being held down by the door and consequently having a bend radius smaller than the required minimum.

Model names of the SSCNET III cable	Minimum bend radius [mm]
MR-J3BUS□M	25
MR-J3BUS□M-A	Reinforcement coated cable: 50, Cord: 25
MR-J3BUS□M-B	Reinforcement coated cable: 50, Cord: 30

(b) Tension

If tension is exerted on the SSCNET III cable, transmission loss increases because external forces concentrate on a fixed part of the SSCNET III cable or where the SSCNET III connectors are connected. At worst, the SSCNET III cable breaks or the SSCNET III connectors are damaged. When laying the cable, handle without straining tension.

(c) Lateral pressure

If lateral pressure is exerted on the SSCNET III cable, the cable distorts, the internal optical fibers get stressed, and transmission loss increases. At worst, the SSCNET III cable may break. Being tied in a bundle also causes such state. Do not tighten up the SSCNET III cable with bands such as a nylon band (TY-RAP).

Do not trample the cable, let the cable be caught by the door of a control panel or other possible situations.

(d) Twisting

If the SSCNET III cable is twisted, the same stress as that localized lateral pressure or bending exerts is exerted. Such condition increases transmission loss and at worst, the SSCNET III cable breaks.

(e) Disposal

Hydrogen fluoride or hydrogen chloride gas, corrosive and harmful, may be generated when the optical cable (cord) used for the SSCNET III cable is incinerated.

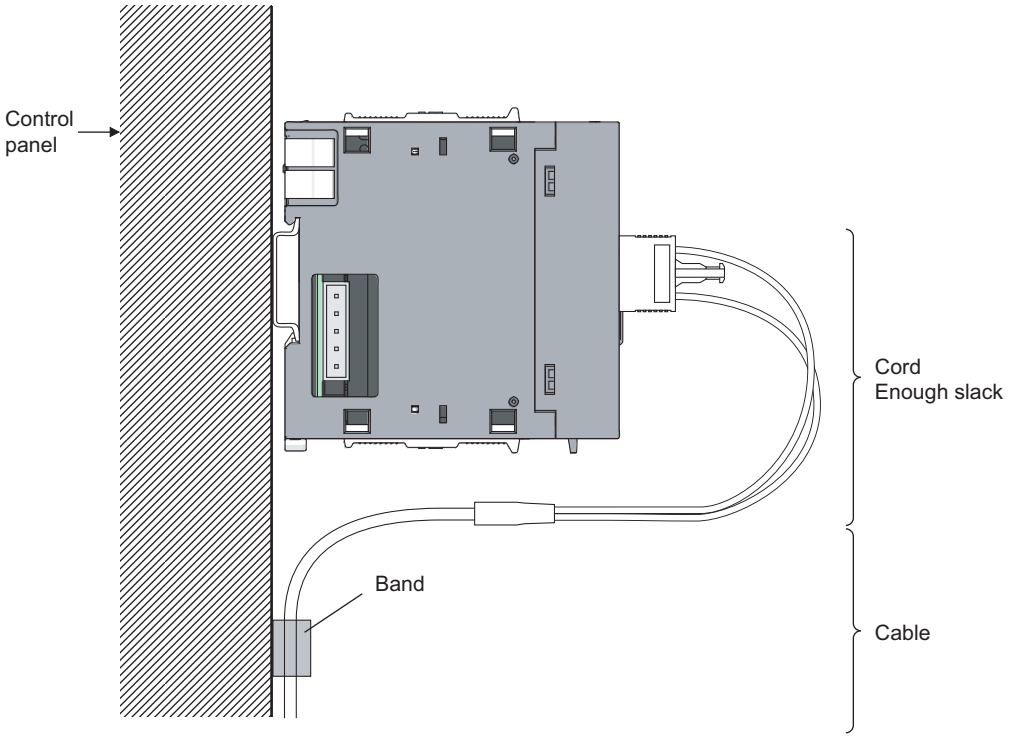
When disposing the SSCNET III cable, make a request to a company treating industrial waste which has an incineration facility for treating hydrogen fluoride and hydrogen chloride gas.

(f) Wiring the SSCNET III cable

Place the SSCNET III cable in a duct or fix the cable with a band in proximity to the head module to avoid applying the cable's weight to the SSCNET III connector of the Motion controller.

Secure the following space for wiring.

- If placing in a duct (☞ Page 35, Section 6.1.2)
- If tying with a band: Give enough slack to the optical cord so that the minimum bend radius is obtained, and do not twist the cord. When tying the cable in a bundle, fix and hold it in position with cushioning such as a sponge or rubber which does not contain transitional plasticizers. When adhesive tape is used to tie, it is recommended that Flame retardant Acetate cloth adhesive tape 570F (Teraoka Seisakusho co.,Ltd.) be used.



(5) Precautions for wiring

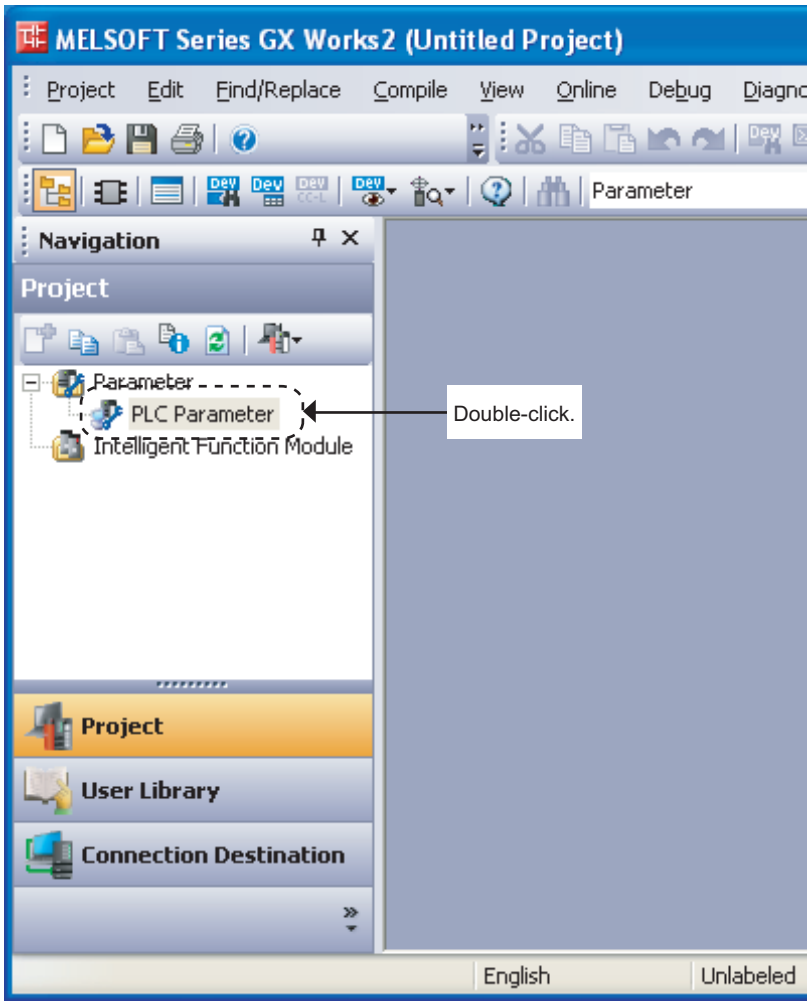
- Use an SSCNET III-dedicated cable.
- The SSCNET III cable has a limit on the cable bend radius. Check the limit of the cable used.
- Place the SSCNET III cable in a duct or fix the cable with a band. If not, the dangling cable may swing or inadvertently be pulled, resulting in damage to a module or cables or malfunction due to poor contact.
- When laying the SSCNET III cable, do not touch the core of the connector of the cable side or the module side, and protect it from dirt and dust. If any oil from your hand, or any dirt or dust sticks to the core, it can increase transmission loss, causing cyclic transmission or transient transmission to fail.
- Hold the connector part when connecting and disconnecting the SSCNET III cable.
- Securely connect the SSCNET III cable connector to a module connector until it clicks.

Memo

CHAPTER 7 PARAMETER SETTING

This chapter describes parameter settings of a head module and modules connected to the head module.
Open the setting screens by the following operation using GX Works2.

Project window ⇨ [Parameter] ⇨ [PLC Parameter]



Point

Set parameters for the entire network (including the head module, the number of servo amplifiers, and the link device assignment settings) to the Motion controller. For details, refer to the following.
Programming Manual (COMMON) for the Motion controller used

7.1 PLC Parameters

This section describes the setting screens and the descriptions of PLC parameters.

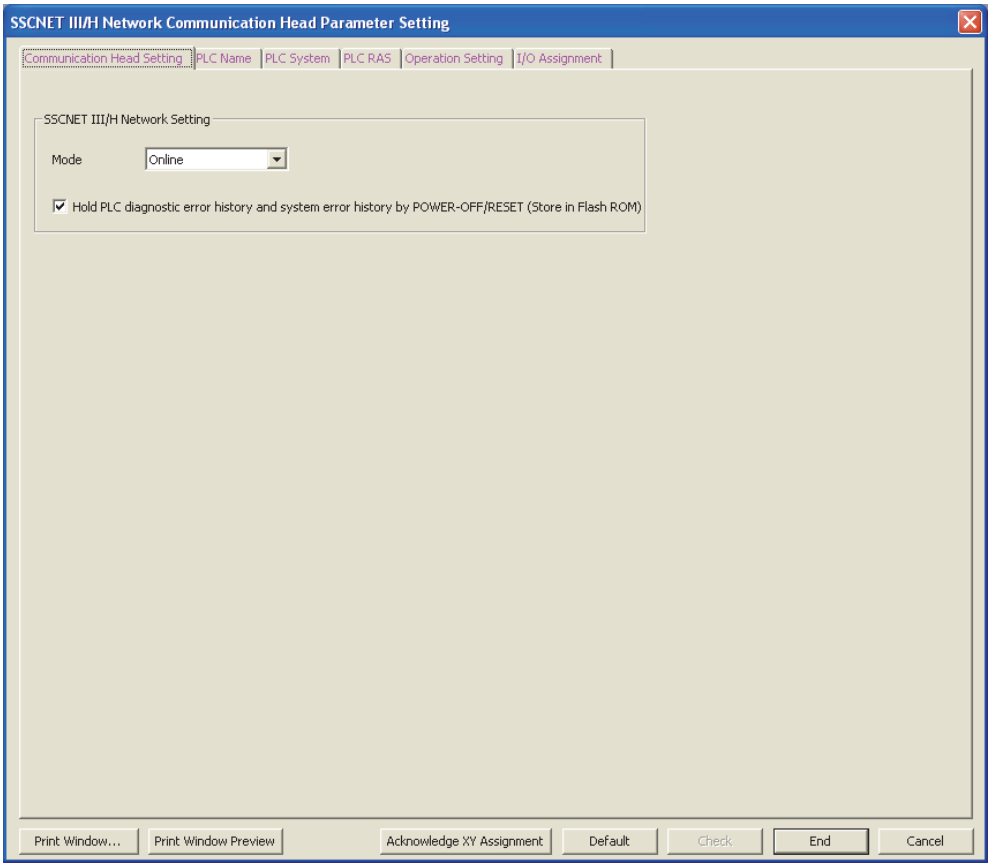
Setting screen	Description	Parameter No.*1	Reference
Communication Head Setting	Set the operation mode of the head module.	01F0H	Page 54, Section 7.1 (1)
PLC Name	Set the label and comment of the head module.	0000H, 0001H	Page 55, Section 7.1 (2)
PLC System	Set parameters for a system including the head module.	1002H	Page 56, Section 7.1 (3)
PLC RAS	Set parameters for the RAS function.	300AH	Page 57, Section 7.1 (4)
Operation Setting	Set parameters to transfer data stored in the following head module devices as cyclic data. • Link special relay (SB) • Link special register (SW) • Special relay (SM) • Special register (SD) • Link register (W)	500FH	Page 58, Section 7.1 (5)
I/O Assignment	Set connection status of each module.	0400H, 0403H to 0405H, 0409H	Page 62, Section 7.1 (6)

*1 Parameter numbers are used to identify a location where a parameter error has occurred.

(1) Communication Head Setting

Set the operation mode of the head module.

Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "Communication Head Setting"



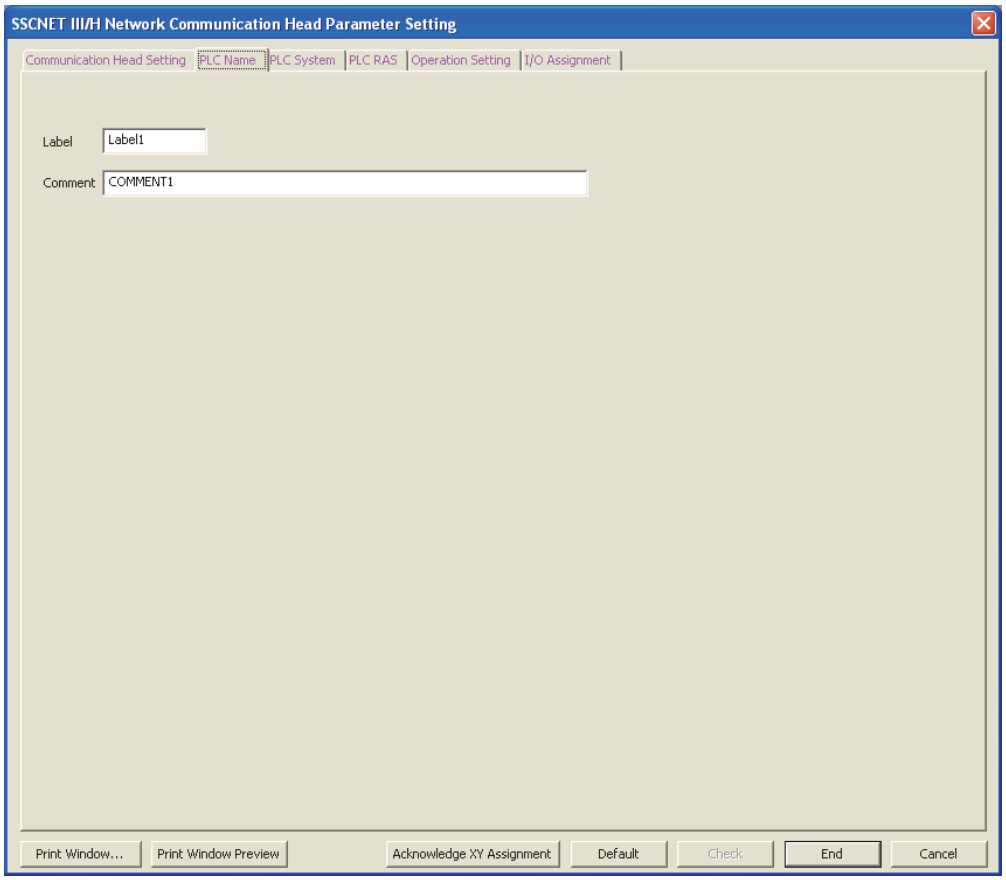
The following table shows setting items.

Item	Description	Setting range
Mode	Select a mode for the head module.	Online/Offline/Self test (Default: Online)
Hold PLC diagnostic error history and system error history by POWER-OFF/RESET (Store in Flash ROM)	Select whether to hold PLC diagnostic results and system error history data after the head module is powered off or is reset. Clearing the checkbox will delete data displayed in the "PLC diagnostics" window and the "Error History" window when the head module is powered off or is reset. (☞ Page 84, Section 11.2 (1) (a), Page 86, Section 11.3)	Selected/not selected (Default: Selected)

(2) PLC Name

Set the label and comment of the head module.

Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "PLC Name"



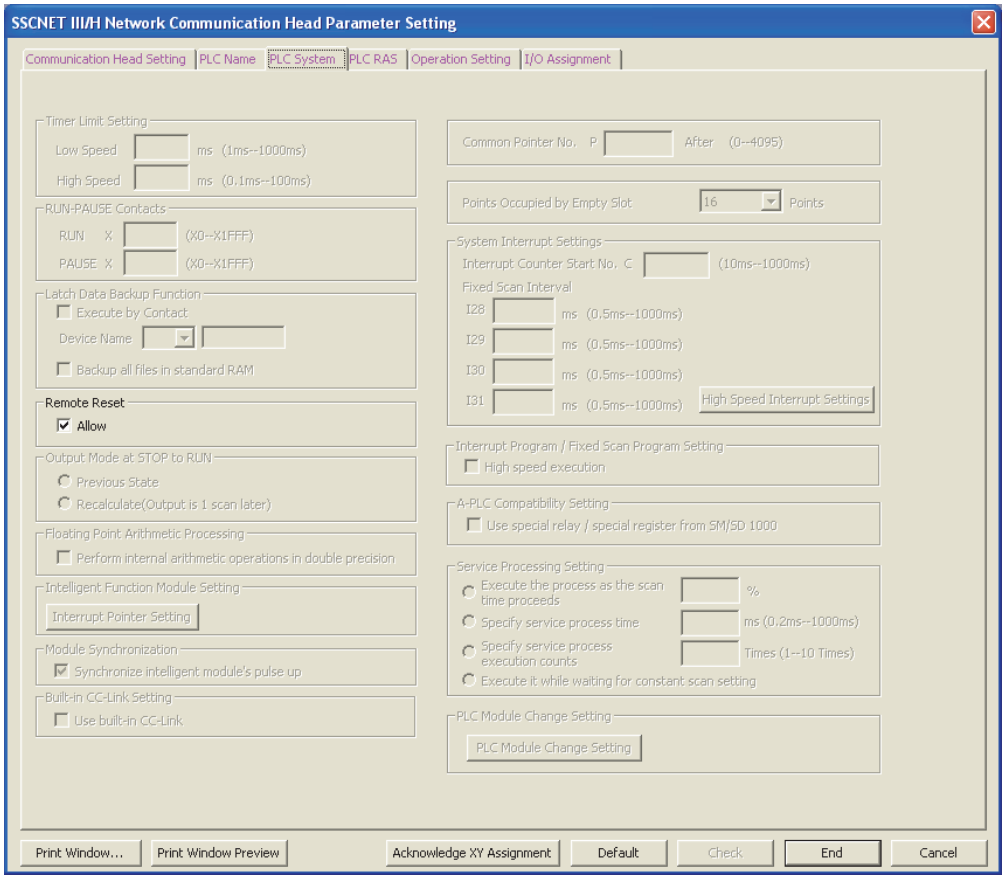
The following table shows setting items.

Item	Description	Setting range
Label	Enter the label (name or application) of the head module.	Up to 10 characters (Default: Blank)
Comment	Enter the comment of the head module.	Up to 64 characters (Default: Blank)

(3) PLC System

Set parameters for a system including the head module.

Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "PLC System"



The following table shows setting items.

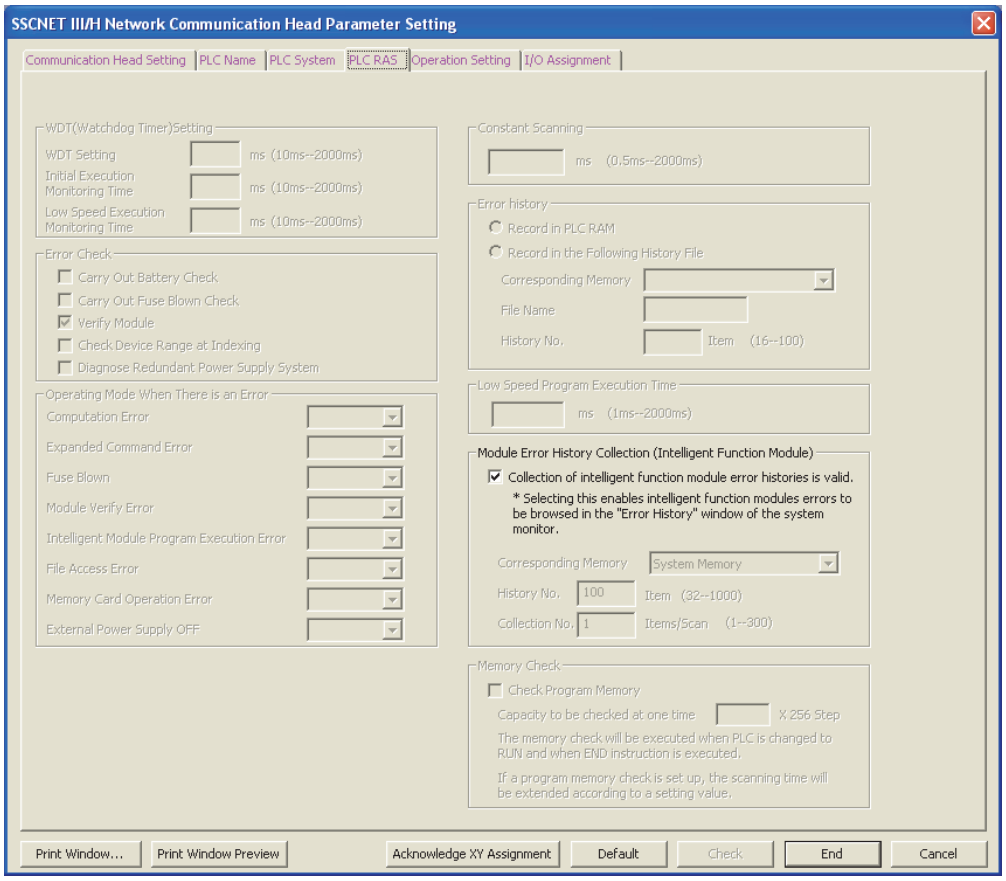
Items other than "Remote Reset" cannot be set to the head module.

Item		Description	Setting range
Remote reset	Allow	Select whether to allow GX Works2 to perform remote reset to the head module.	Selected/not selected (Default: Selected)

(4) PLC RAS

Set parameters for the RAS function.

Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "PLC RAS"



The following table shows setting item.

Items other than "Module Error History Collection (Intelligent Function Module)" cannot be set to the head module.

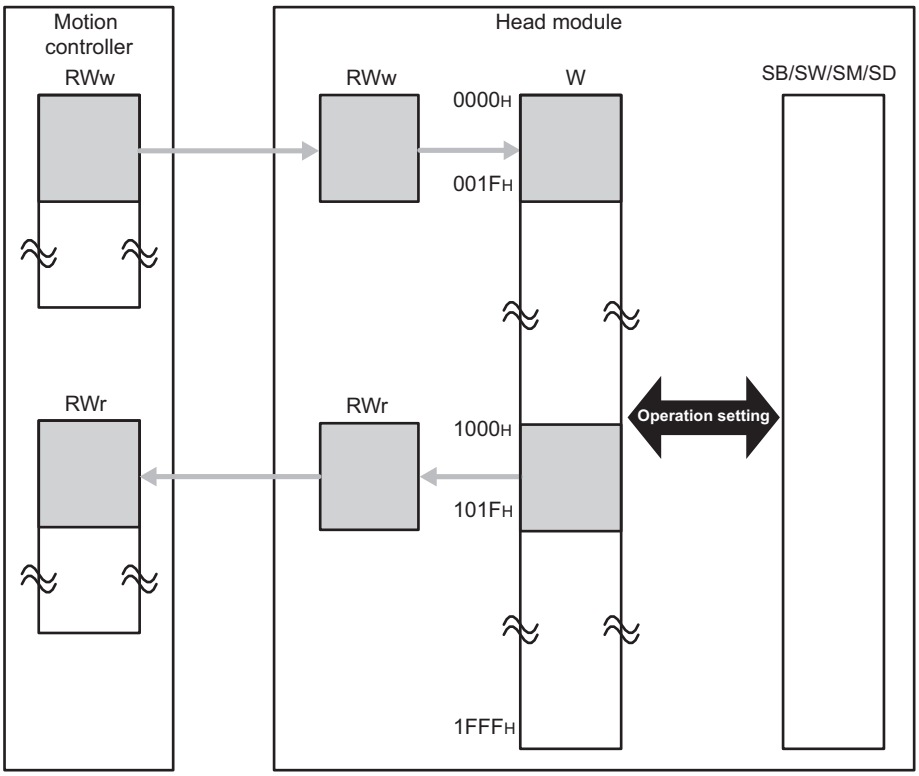
Item		Description	Setting range
Module Error History Collection(Intelligent Function Module)	Collection of intelligent function module error histories is valid.	Select whether to collect errors occurred in an intelligent function module with the head module.	Selected/not selected (Default: Selected)

(5) Operation Setting

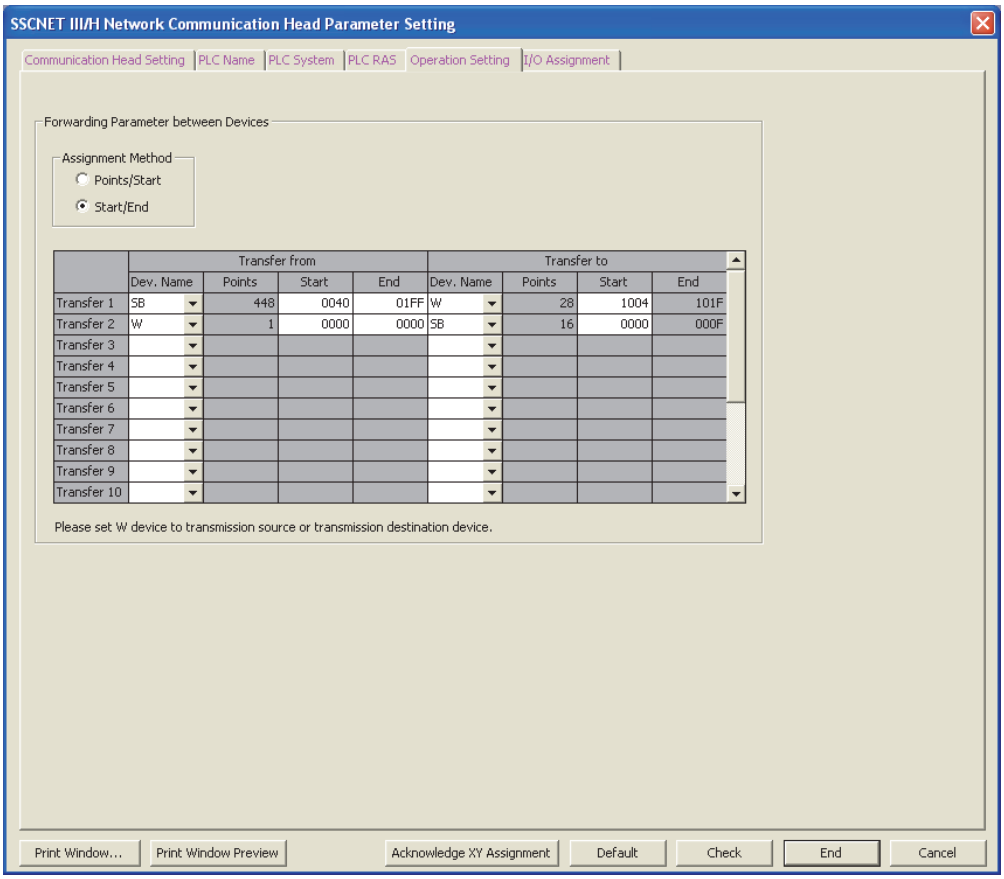
Set parameters to transfer data stored in the following head module devices as cyclic data.

- Link special relay (SB)
- Link special register (SW)
- Special relay (SM)
- Special register (SD)
- Link register (W)

In Operation Setting, the following ⟷ part is configured.



Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "Operation Setting"



The following table shows setting items.

Item	Description	Setting range
Assignment Method	Select a link device assignment method. • Points/Start: Enter the points and start numbers of devices. • Start/End: Enter the start and end device numbers.	• Points/Start • Start/End (Default: Start/End)
Dev. Name	Select transfer source devices and transfer target devices. Select "W" for either of the devices.	• W • SB • SW • SM • SD (Default: Blank)
Points	Enter the points of devices to be transferred.	• W: 1 to 4096 • SB: 16 to 8192 • SW: 1 to 8192 • SM: 16 to 2048 • SD: 1 to 2048 (Default: Blank)
Start	Enter the start number of a device to be transferred.	Transfer From • W: 0 to 1FFF • SB: 0 to 1FF0 • SW: 0 to 1FFF • SM: 0 to 2032 • SD: 0 to 2047 (Default: Blank) Transfer To • W: 1000 to 1FFF • SB: 0 to 1FF0 • SW: 0 to 1FFF • SM: 0 to 2032 • SD: 0 to 2047 (Default: Blank)

Item	Description	Setting range
End	Enter the end number of a device to be transferred.	Transfer From • W: 0 to 1FFF • SB: F to 1FFF • SW: 0 to 1FFF • SM: 15 to 2047 • SD: 0 to 2047 (Default: Blank) Transfer To This item is automatically set according to the setting of transfer source.

(a) Setting example

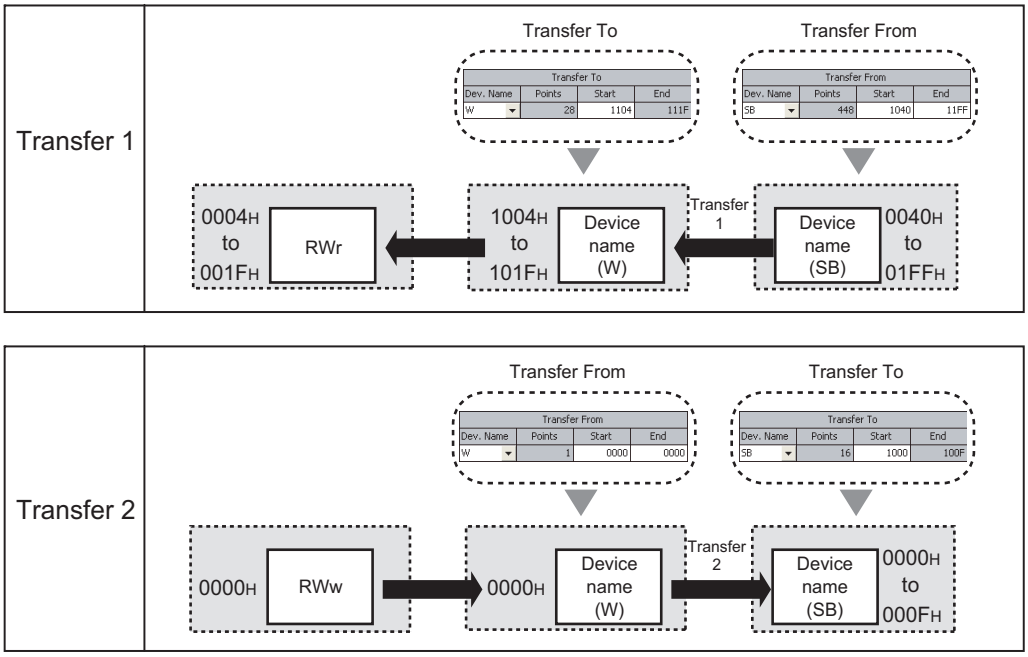
To transfer the link special relay (SB) data of the head module as cyclic data, transfer the link special relay (SB) value to link register (W).

Setting for Forwarding Parameter between Devices

	Transfer from				Transfer to			
	Dev. Name	Points	Start	End	Dev. Name	Points	Start	End
Transfer 1	SB	448	0040	01FF	W	28	1004	101F
Transfer 2	W	1	0000	0000	SB	16	0000	000F

Transfer 1: Transfers the values in SB0040 to SB01FF to W1004 to W101F.
Transfer 2: Transfers the value in W0000 to SB0000 to SB000F.

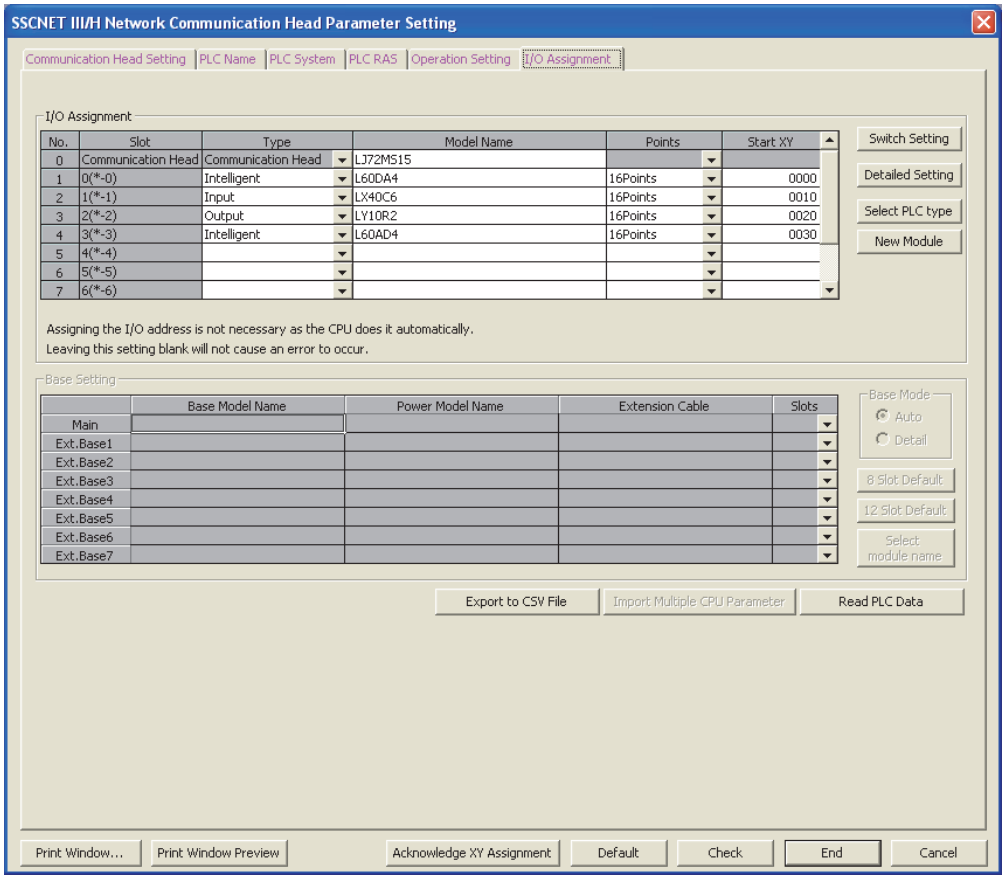
Operation of the head module



(6) I/O Assignment

Set connection status of each module.

Project window ⇨ [Parameter] ⇨ [PLC Parameter] ⇨ "I/O Assignment"



The following table shows setting items.

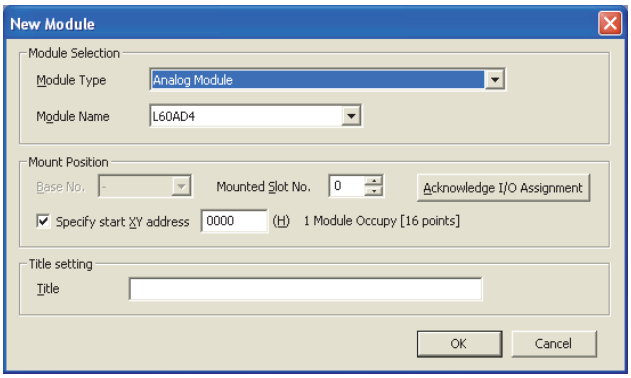
Item		Description	Setting range
I/O Assignment	Type	Select a connected module type.	Empty, Input, Output, Intelligent (Default: Blank)
	Model Name	Enter the model name of the connected module when required.	Up to 16 characters (Default: Blank)
	Points	Select the occupied I/O points of a module connected to the head module.	0 Point, 16 Points, 32 Points, 64 Points, 128 Points (Default: Blank)
	Start XY	Enter the start I/O number.	0000H to 0FF0H (Default: Blank)
Switch Setting button		Set intelligent function module switches.	—
Detailed Setting button	Error Time Output Mode	Select output mode in the following status: • An error occurred in the head module. • A data link error occurred.	Clear/Hold (Default: Clear)
	PLC Operation Mode at H/W Error	Specify whether to stop the auto refresh of the head module or not, when a hardware error occurs (when the head module detects SP.UNIT DOWN) in the intelligent function module.	Stop/Continue (Default: Stop)
	I/O Response Time	Select the response time of an input module.	1ms, 5ms, 10ms, 20ms, 70ms (Default: 10ms)
Select PLC type button		Set the selected head module to I/O Assignment.	—
New Module button		Set the Model Name, Points, and Start XY of the selected module to I/O Assignment.	—

7.2 Intelligent Function Module Parameters

Set intelligent function module parameters.

Set the parameters in the "New Module" window.

Project window ⇨ Right-click [Intelligent Function Module] ⇨ [New Module]



Item		Description	Setting range
Module Selection	Module Type	Select a module type.	📖 User's manual for the intelligent function module used
	Module Name	Select a model name.	
Mount Position	Mounted Slot No.	Select the number of the slot where an intelligent function module is mounted.	
	Acknowledge I/O Assignment button	Click this button to check I/O assignment setting configured in the PLC Parameter.	
	Specify start XY address	Enter the start I/O number.	
Title setting	Title	Enter a title displayed in the Project window.	

After these settings are configured, a folder is created under the "Intelligent Function Module" folder in the Project window.

Point

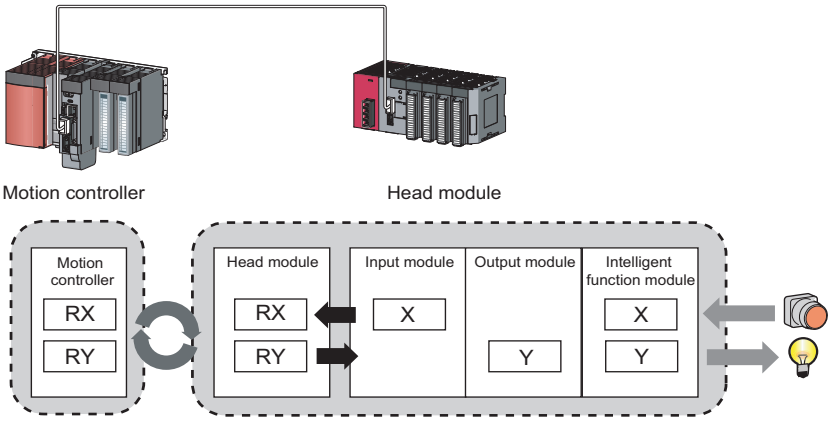
X, Y, and W can be set as an auto refresh device.

CHAPTER 8 CYCLIC TRANSMISSION

This chapter describes how to perform cyclic transmission of bit and word device data of the head module.

8.1 Cyclic Transmission of Bit Device Data

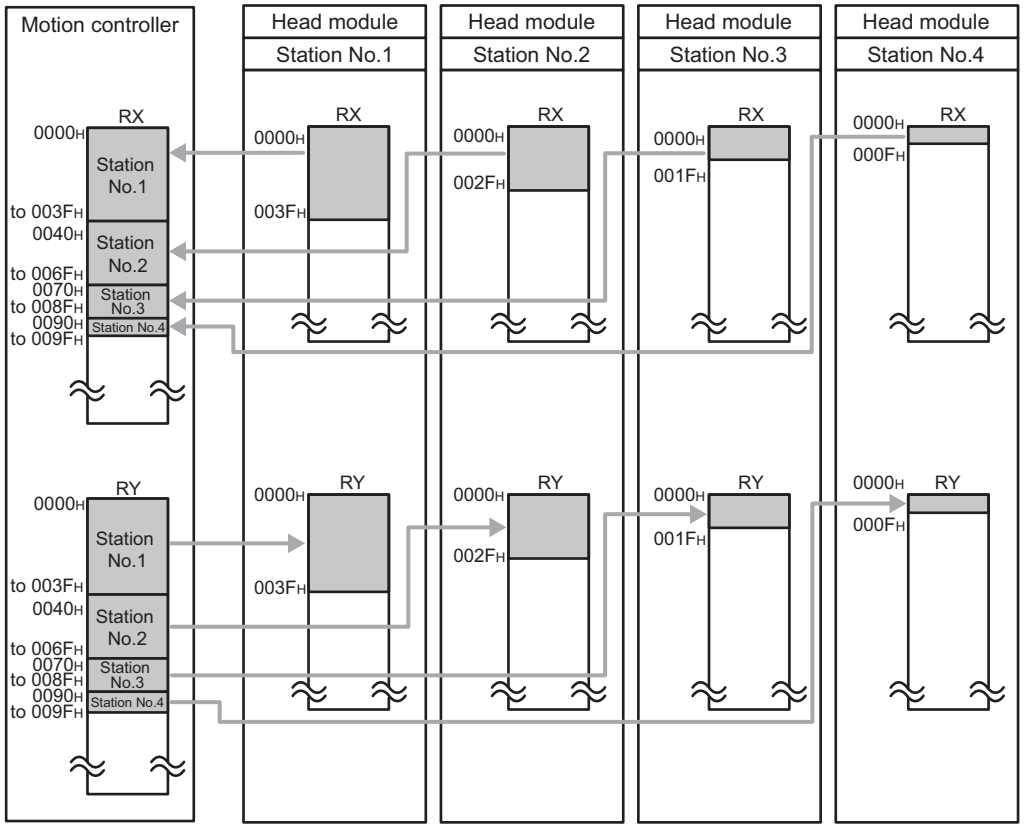
The inputs (X) and outputs (Y) of the modules connected to the head module can be handled just like those of the Motion controller.



(1) Data flow

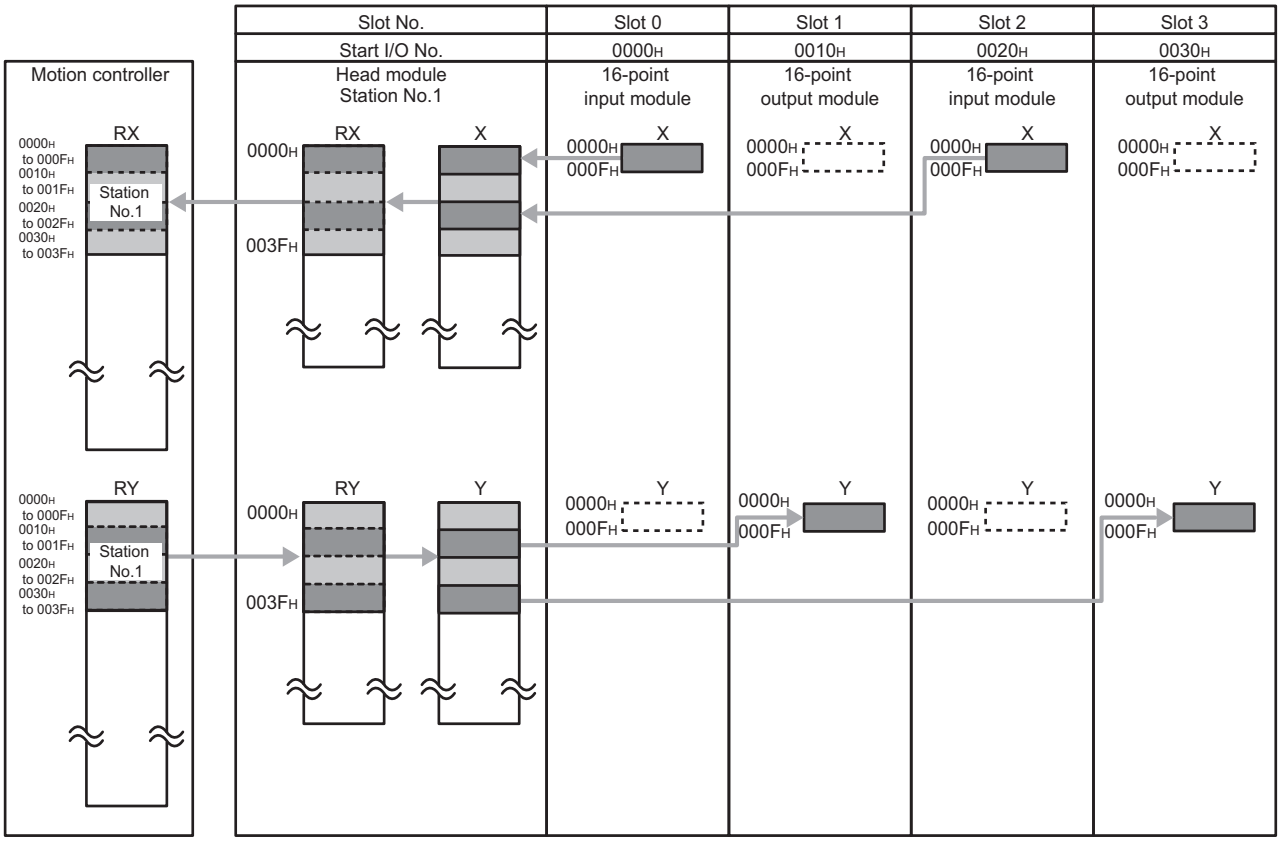
This section describes the data flow and the setting for cyclic transmission of bit device data.

- When inputting from a head module to the Motion controller: The input data (X) of each module connected to the head module is input to the remote input (RX) of the Motion controller.
- When outputting from the Motion controller to a head module: The remote output data (RY) of the Motion controller is output to the output (Y) of each module connected to the head module.



The I/O data flow between the Motion controller and the head module on the station number 1 are shown in Page 66, Section 8.1 (1) (a), Page 67, Section 8.1 (1) (b).

(a) When the I/O assignment setting for the head module is default



(b) When the I/O assignment setting for the head module is changed

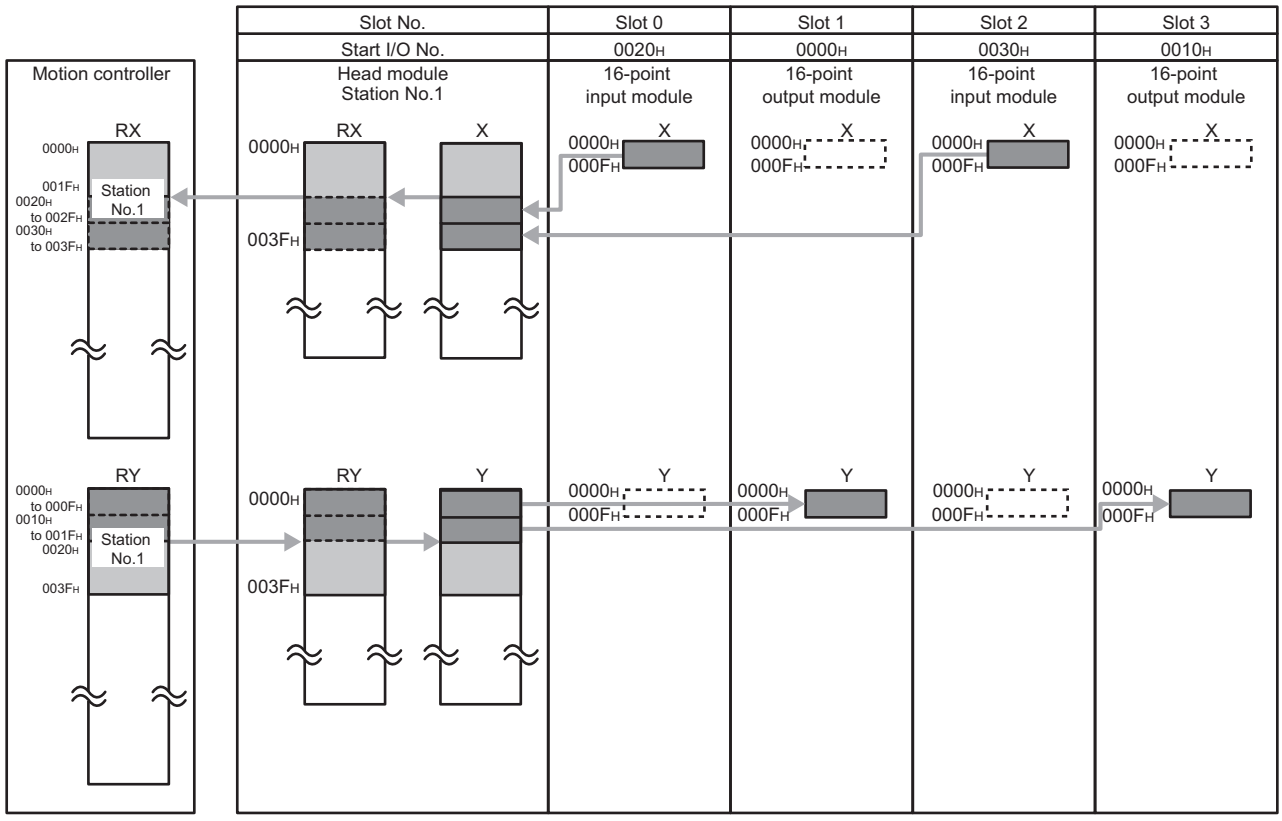
The figure on the bottom shows assignment when I/O Assignment is set in GX Works2 as the figure below.

I/O Assignment

No.	Slot	Type	Model Name	Points	Start XY
0	Communication Head	Communication Head	LJ72MS15		
1	0(*-0)	Input	LX40C6	16Points	0020
2	1(*-1)	Output	LY10R2	16Points	0000
3	2(*-2)	Input	LX40C6	16Points	0030
4	3(*-3)	Output	LY10R2	16Points	0010
5	4(*-4)				
6	5(*-5)				
7	6(*-6)				

Switch Setting | Detailed Setting | Select PLC type | New Module

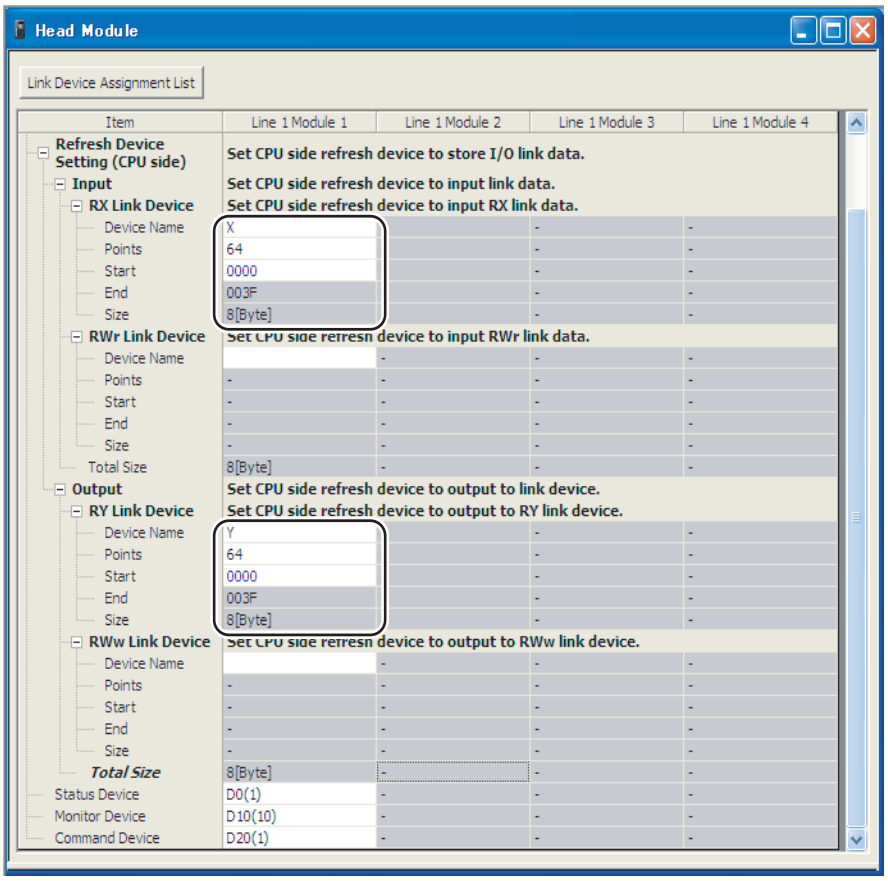
Assigning the I/O address is not necessary as the CPU does it automatically.
Leaving this setting blank will not cause an error to occur.



(2) Setting method

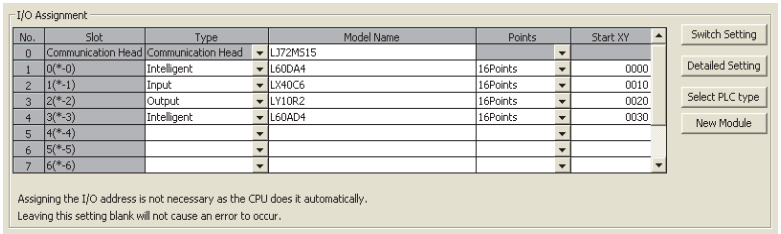
In the Head Module window of MT Developer2, set the total number of the input/output (X/Y) points of the modules connected to the head module in 16-point units.

To match the settings with those in the figure on the previous page, set "RX Link Device" and "RY Link Device" to "0000" to "003F".



Point

- To set an empty slot in the head module or to change a start I/O number, modify the data in the I/O Assignment setting of the head module with GX Works2.



- If the number of points is going to be increased for a system extension or other reasons, set a large number of "RX Link Device" and "RY Link Device" in the Head Module window of MT Developer2. Doing so will avoid changing the parameter of the Motion controller at the system extension. However, increasing the number of the points lengthens the processing time.

(3) Output status for each status

Depending on the states of the data link and head module, data may not be able to be output.

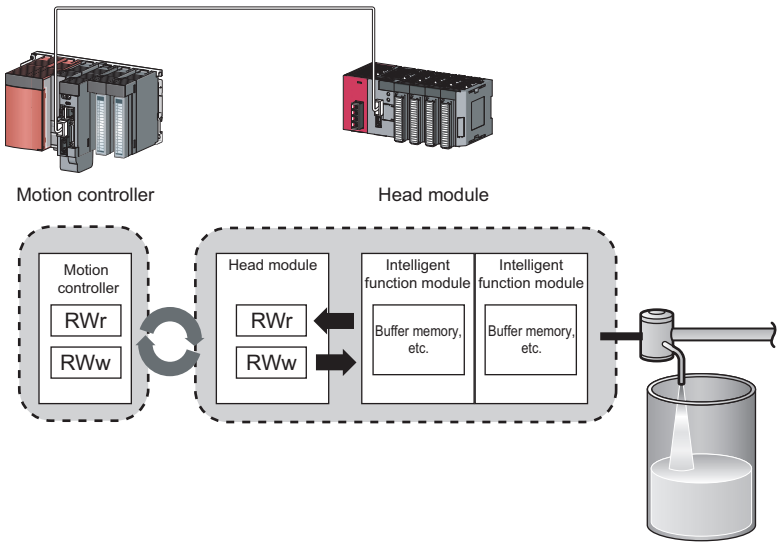
The following table shows how the states of the data link and head module affect the output (Y).

-: Not dependent on the status

Switch	Head module status	Data link status	Output (Y) status
RUN	Operating normally	Cyclic transmission in progress	Varies depending on the status and settings of the Motion controller. (📖 User's manual for the Motion controller used) (1) If the Motion controller is in the stop error status: The output (Y) status follows the "Error Time Output Mode" setting in the PLC Parameter. (☞ Page 62, Section 7.1 (6)) The analog output status of the digital-analog converter module follows the setting of the analog output HOLD/CLEAR function. (📖 MELSEC-L Digital-Analog Converter Module User's Manual) (2) When the Motion controller is in the STOP status: The output (Y) turns off. The analog output status of the digital-analog converter module follows the setting of the analog output HOLD/CLEAR function. (📖 MELSEC-L Digital-Analog Converter Module User's Manual) The refresh device status of the Motion controller is as follows: • Turns off if "Y" is specified for the CPU side device. • Holds its status if "other than Y (M, L, etc.)" is specified for the CPU side device.
RUN	Operating normally	Cyclic transmission stopped	The output (Y) status follows the "Error Time Output Mode" setting in the PLC Parameter. (☞ Page 62, Section 7.1 (6)) The analog output status of the digital-analog converter module follows the setting of the analog output HOLD/CLEAR function. (📖 MELSEC-L Digital-Analog Converter Module User's Manual)
RUN	Operating normally	Disconnected	The output (Y) status is held for 3.5ms after the communication with the Motion controller is terminated due to a break in the SSCNET III cable or other possible causes. The output (Y) status after disconnection follows the "Error Time Output Mode" setting in the PLC Parameter. (☞ Page 62, Section 7.1 (6))
—	Error	—	The output (Y) status follows the "Error Time Output Mode" setting in the PLC Parameter. (☞ Page 62, Section 7.1 (6))
STOP	Operating normally	—	The output (Y) turns off. The analog output status of the digital-analog converter module follows the setting of the analog output HOLD/CLEAR function. (📖 MELSEC-L Digital-Analog Converter Module User's Manual)

8.2 Cyclic Transmission of Word Device Data

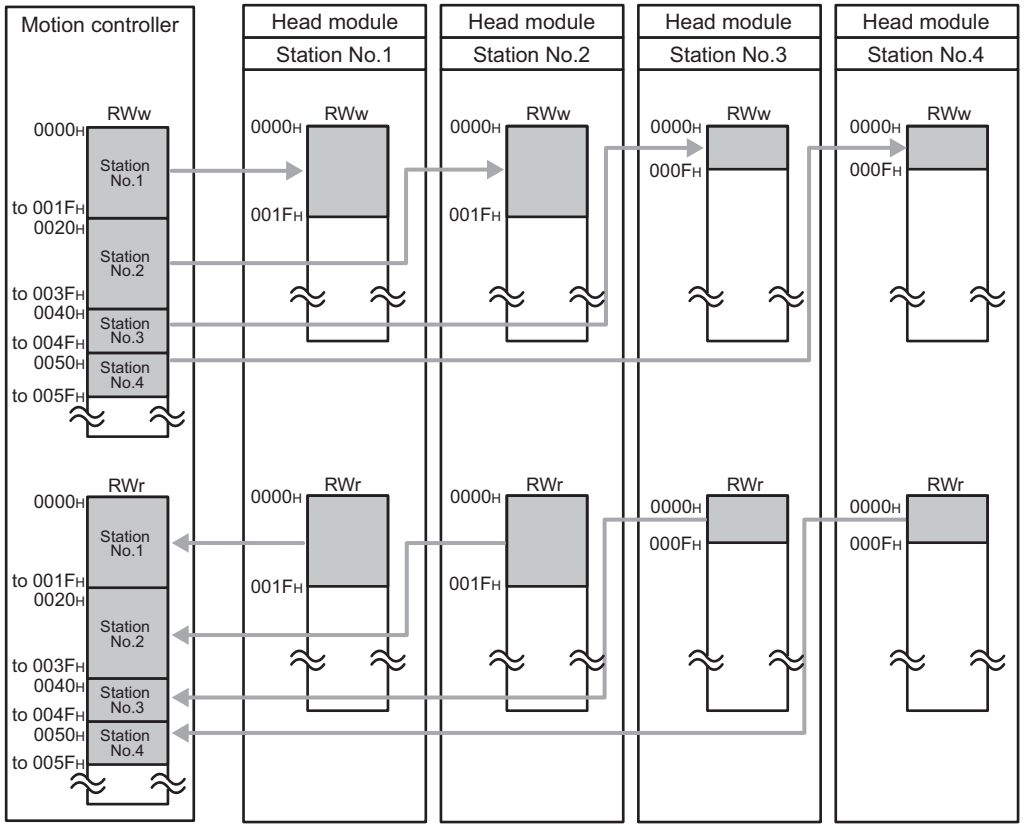
Word data, such as the buffer memory of a module connected to the head module, can be used in the word devices of the Motion controller.



(1) Data flow

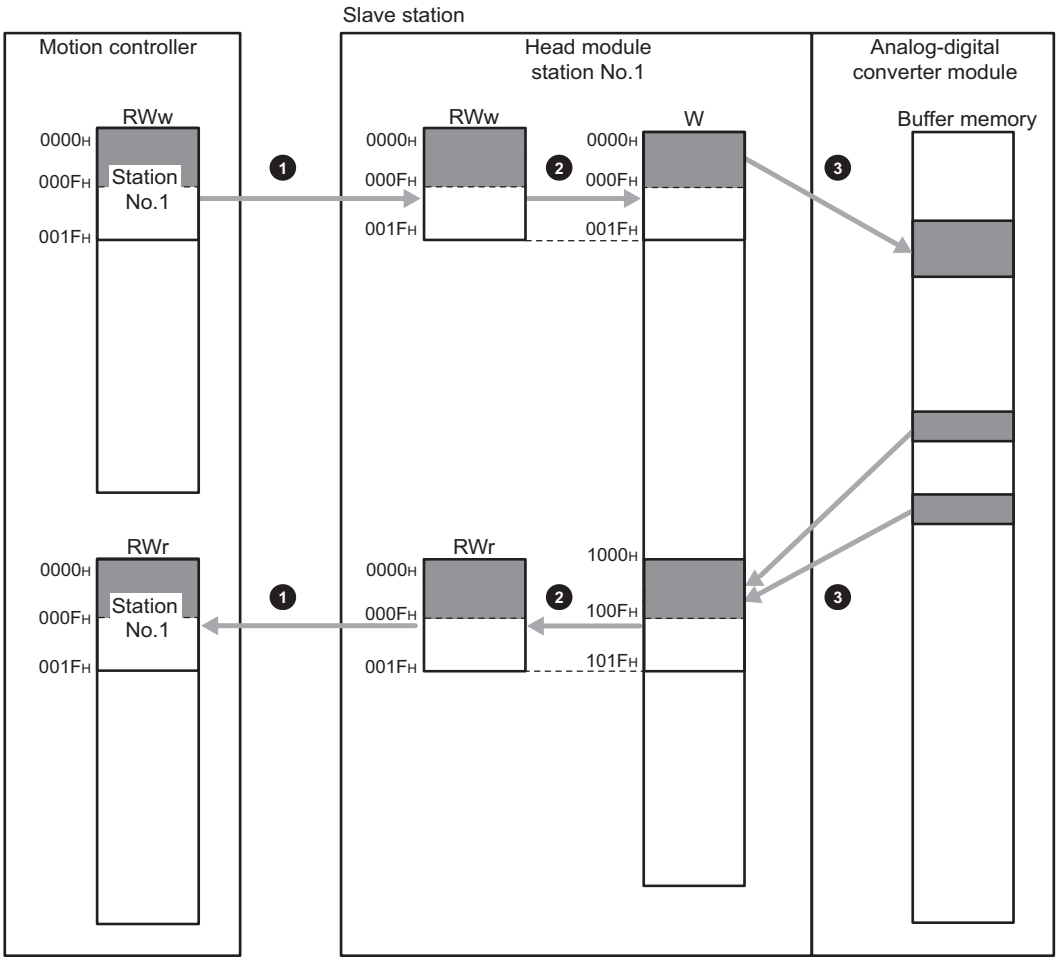
This section describes the data flow and the setting for cyclic transmission of word device data.

- When transferring data from the Motion controller to the head module: The remote register (RWw) data of the Motion controller is transferred to the buffer memory of an intelligent function module connected to the head module.
- When transferring data from the head module to the Motion controller: The buffer memory data of the intelligent function module connected to the head module is transferred to the remote register (RWr) of the Motion controller.



The data flow between the Motion controller and the head module of station number 1 is shown in Page 72, Section 8.2 (1) (a).

(a) When the points of "RWw Link Device" and "RWr Link Device" are set to 32 points in the Head Module window of MT Developer2



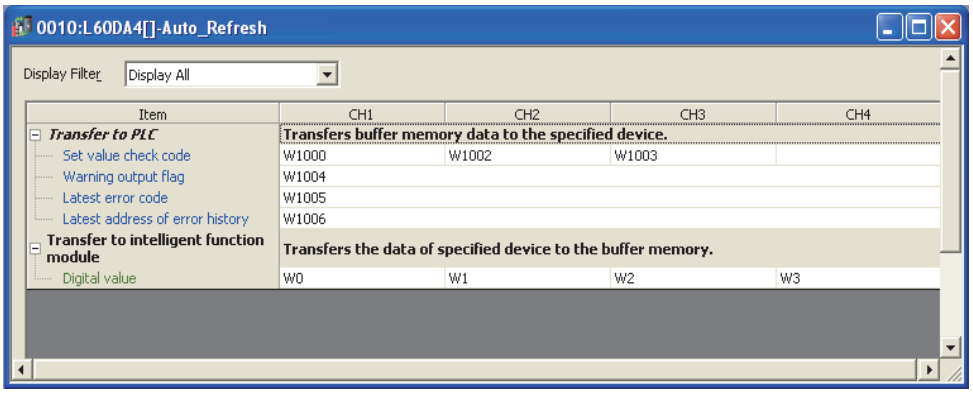
❶ Set RWw/RWr ranges assigned to the head module in the Head Module window of MT Developer2. (☞ Page 73, Section 8.2 (2), procedure 2)

❷ RWw0 is assigned from W0.
RWr0 is assigned from W1000.

❸ Set the refresh range of the buffer memory of the head module and the intelligent function module using the auto refresh setting of GX Works2. (☞ Page 73, Section 8.2 (2), procedure 1)

(2) Setting method

1. Set the auto refresh of the intelligent function module connected to the head module with GX Works2.

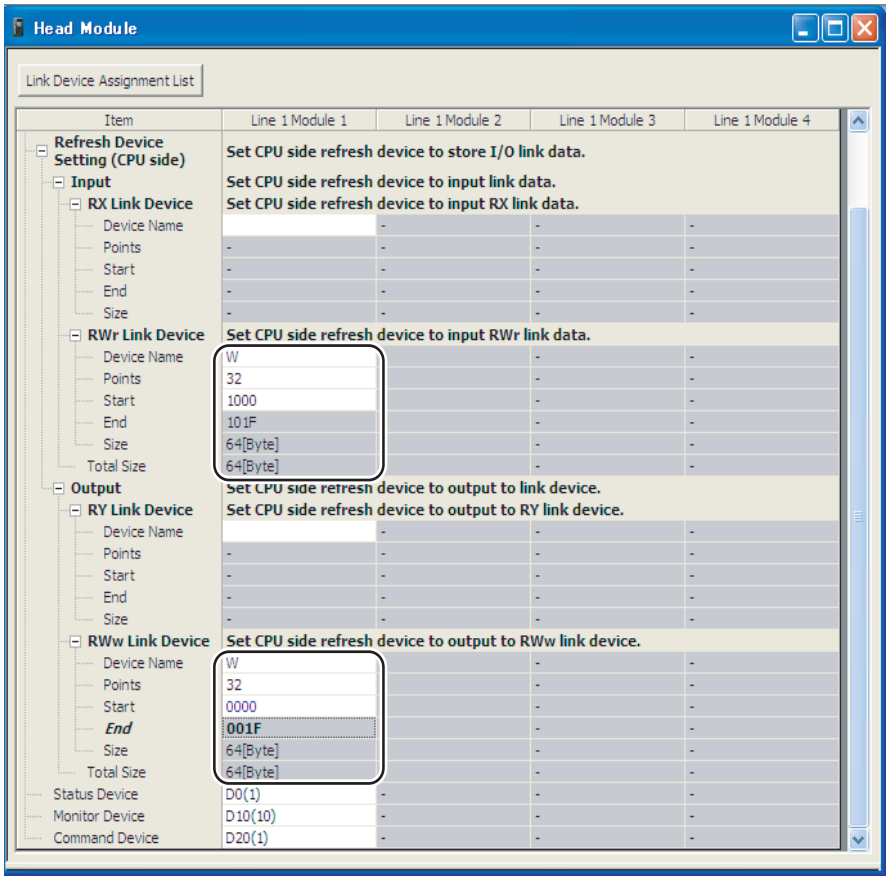


Specify the following devices as the devices to be auto refreshed.

Item	Setting range of auto refresh target device
"Transfer to PLC"	W1000 to W101F
"Transfer to intelligent function module"	W0 to W1F

2. In the Head Module window of MT Developer2, set the number of RWw/RWr points assigned to the head module.

The number of points should be higher than the number of points set in the auto refresh setting, in the step 1 above. (Set the number of points whichever is greater between "Transfer to CPU" and "Transfer to intelligent function module".)



Point

If the number of points is going to be increased for a system extension or other reasons, set a large number of "RWw Link Device" and "RWr Link Device" in the Head Module window of MT Developer2. Doing so will avoid changing the parameter of the Motion controller at the system extension. However, increasing the number of the points lengthens the processing time.

Memo

CHAPTER 9 SSCNET III COMMUNICATION CONDITION MONITOR

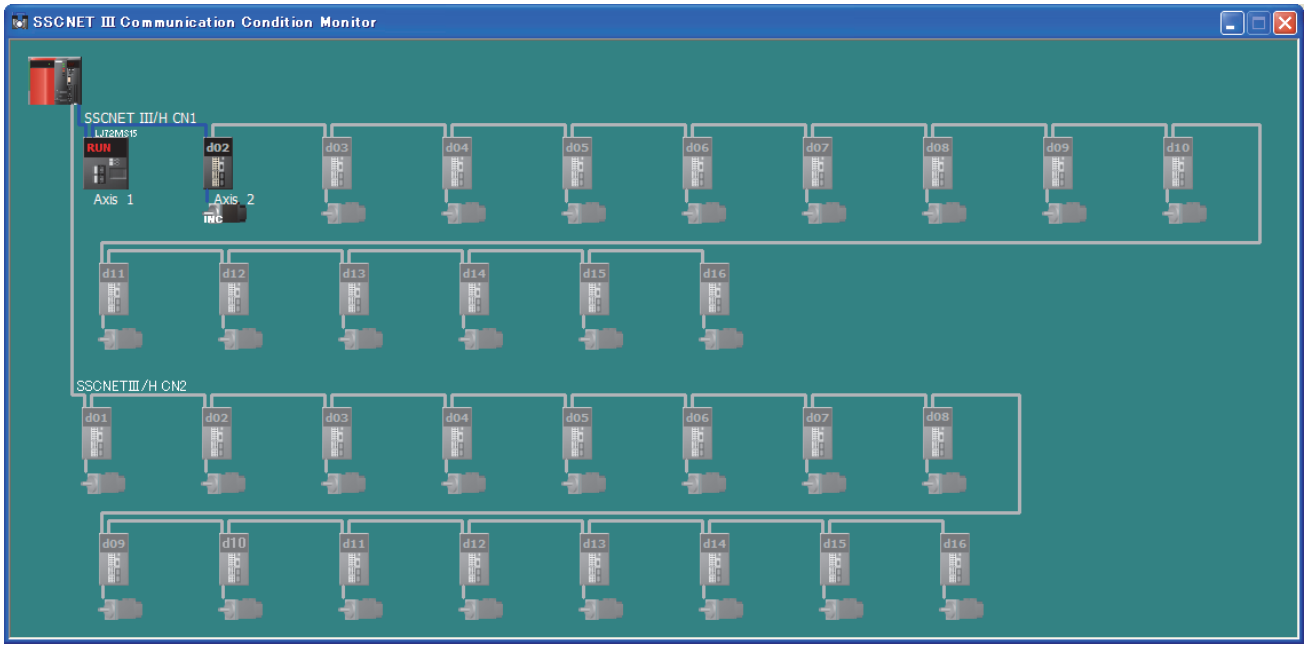
This chapter describes how to check the location and the cause of an error which has occurred in the network with SSCNET III Communication Condition Monitor of MT Developer2.
Connect MT Developer2 to the Motion controller to check the connection status of servo amplifiers and head modules on SSCNET III/H.

(1) Starting the SSCNET III Communication Condition Monitor

This section describes how to start the SSCNET III Communication Condition Monitor.

1. **Connect MT Developer2 to the Motion controller.**
2. **Start the SSCNET III Communication Condition Monitor from the menu of MT Developer2.**

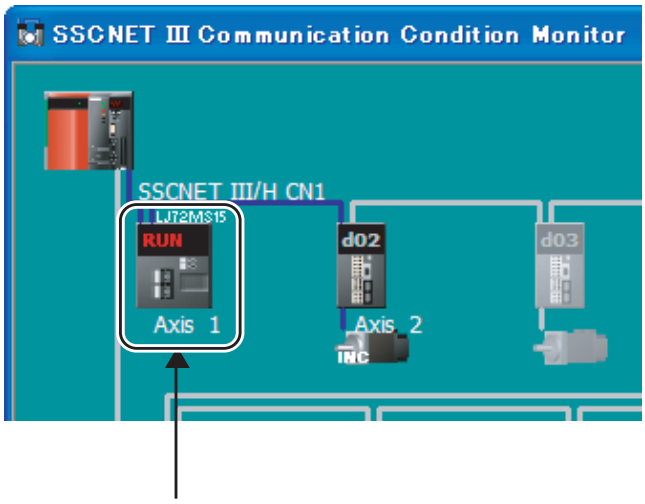
   [Online] ⇨ [Monitor] ⇨ [SSCNET III Communication Condition Monitor]



(2) Checking errors

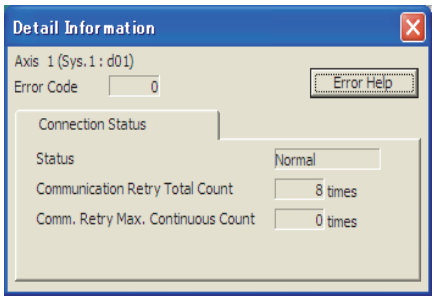
This section describes how to check the location of a communication error with SSCNET III Communication Status Monitor.

(a) When no error occurs



Double-click.

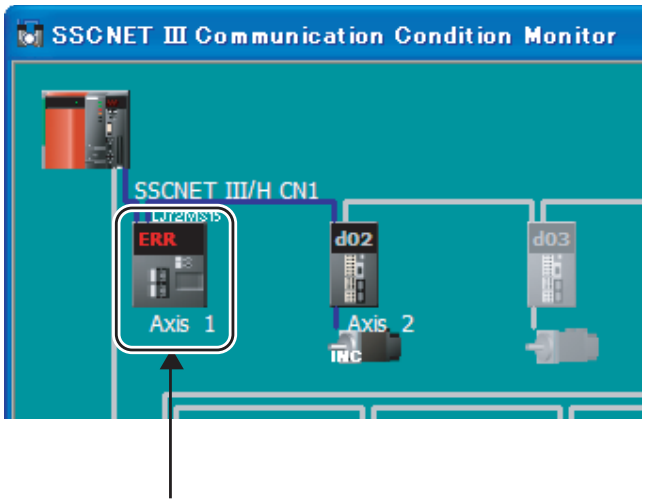
1. **Double-click the corresponding head module in the SSCNET III Communication Condition Monitor window.**



2. **The Detail Information window is displayed.**

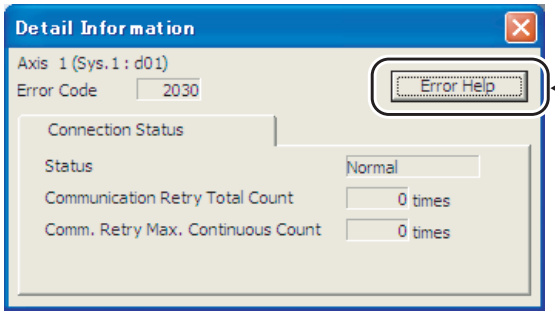
The head module is connected properly.

(b) When an error occurs



Double-click.

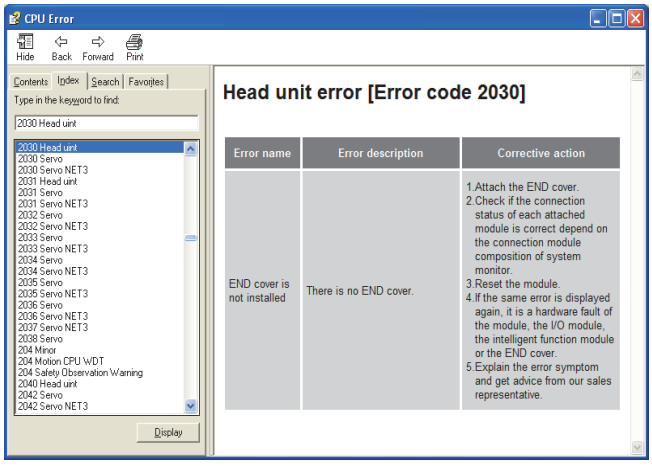
1. **Double-click the corresponding head module in the SSCNET III Communication Condition Monitor window.**



Click.

2. **The Detail Information window is displayed.**
The error code of an error which has occurred is displayed.

3. **Click the** Error Help **button.**


CPU Error
Hide
Back
Forward
Print
Contents
Index
Search
Favorites
Type in the keyword to find:
2030 Head unit
Display
Head unit error [Error code 2030]
Error name
Error description
Corrective action
END cover is not installed
There is no END cover.
1.Attach the END cover.
2.Check if the connection status of each attached module is correct depend on the connection module composition of system monitor.
3.Reset the module.
4.If the same error is displayed again, it is a hardware fault of the module, the I/O module, the intelligent function module or the END cover.
5.Explain the error symptom and get advice from our sales representative.

4. **The Help window for the error is displayed.**

Memo

CHAPTER 10 MAINTENANCE AND INSPECTION

This chapter describes items that must be maintained or inspected daily or periodically to properly use a programmable controller in optimal condition at all times.

10.1 Daily Inspection

This section describes items that must be inspected daily.

Check box	
☐	The modules are securely installed.
☐	The module joint levers are properly locked.
☐	The terminal screws of the modules are properly tightened.
☐	Solderless terminals are physically out of contact and away from each other.
☐	Cable connectors are fully inserted.
☐	The terminal cover of the power supply module is securely attached.

10.2 Periodic Inspection

This section describes items that must be inspected once or twice every 6 to 12 months.
The items must be inspected as well when the equipment has been relocated or modified, or wiring layout has been changed.

Check box

- ☐ The ambient temperature is within 0 to 55°C.
- ☐ The ambient humidity is within 5 to 95%RH.
- ☐ There is no corrosive gas.
- ☐ The voltage across 100VAC terminals is within 85V to 132VAC.
- ☐ The voltage across 200VAC terminals is within the range of 170V to 264VAC.
- ☐ The voltage across 24VDC terminals is within 15.6V to 31.2VDC.
- ☐ The modules are securely installed.
- ☐ No dust or foreign matter is present.
- ☐ No error has occurred.

CHAPTER 11 TROUBLESHOOTING

This chapter describes errors that may occur in the head module, causes of the errors, and corrective actions.

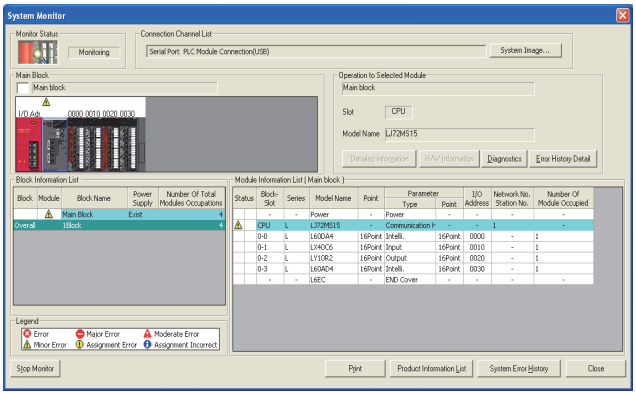
11.1 Before Troubleshooting

Check that the POWER LED of the power supply module is on. If it is off, troubleshoot the power supply module described in the manual of the programmable controller CPU. (📖 MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection))

11.2 Troubleshooting Procedure

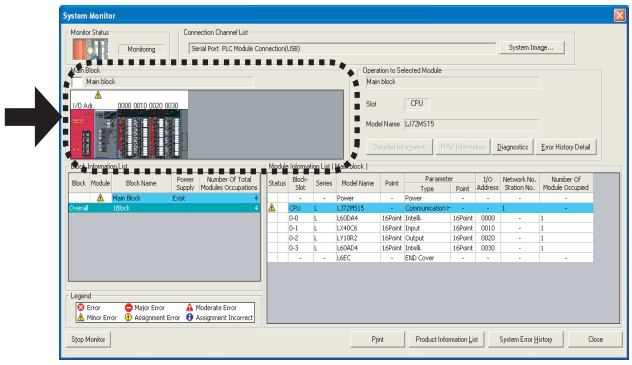
The procedure for identifying the cause of the problem and taking action is explained below.
MT Developer2 or GX Works2 is used for this. Connect MT Developer2 to the Motion controller to monitor the entire network status. (☞ Page 76, CHAPTER 9) If the head module status cannot be monitored due to cable disconnection or any other error, directly connect GX Works2 to the head module.
This section describes the troubleshooting procedure taken when GX Works2 is directly connected to the head module.

(1) Procedure



1. Connect GX Works2 to the head module, and open the "System Monitor" window.

[Diagnostics] ⇨ [System Monitor]



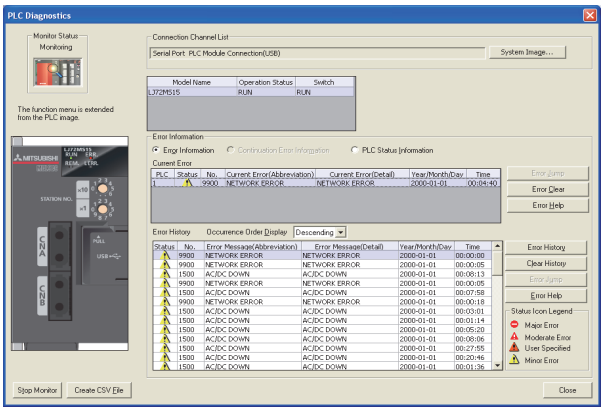
2. Select the module in which an error has occurred.

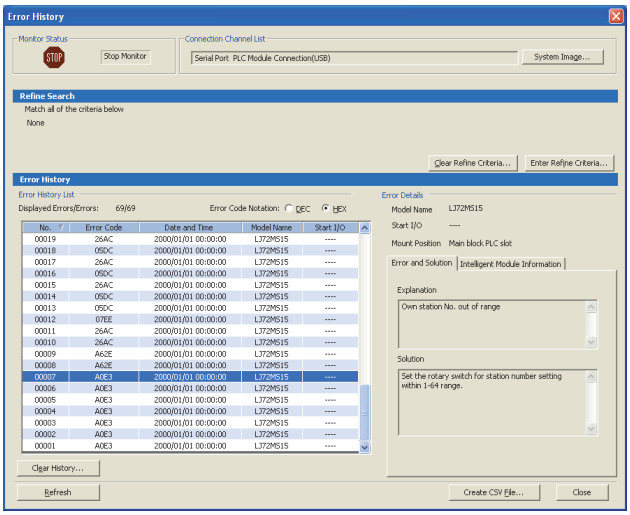
- When the selected module is the head module (☞ Page 84, Section 11.2 (1) (a))
- When the selected module is any other than the head module (☞ Page 85, Section 11.2 (1) (b))

Point

When data link cannot be performed even though no failure is shown in "System Monitor", check if any error has occurred with SSCNET III Communication Condition Monitor of MT Developer2. (☞ Page 76, CHAPTER 9)

(a) Checking for failure of the head module





1. Selecting the head module in "System Monitor" and clicking the Diagnostics button will open the "PLC Diagnostics" window.

2. Select the error that is occurring, and click the Error Help button to check the cause and action.

When data link cannot be performed even though no failure is shown in "PLC Diagnostics", open the SSCNET III Communication Condition Monitor window of MT Developer2 and take action. (☞ Page 76, CHAPTER 9)

3. Reset of the head module and errors occurred before power off can be checked in the "Error History" window.

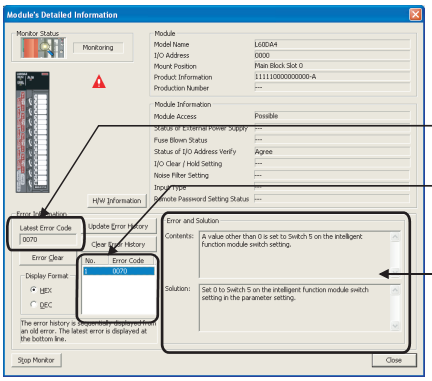
[Diagnostics] ⇨ [System Monitor] ⇨ System Error History button

In the single "Error History" window, the error history of the head module and intelligent function modules can be viewed. (☞ Page 86, Section 11.3)

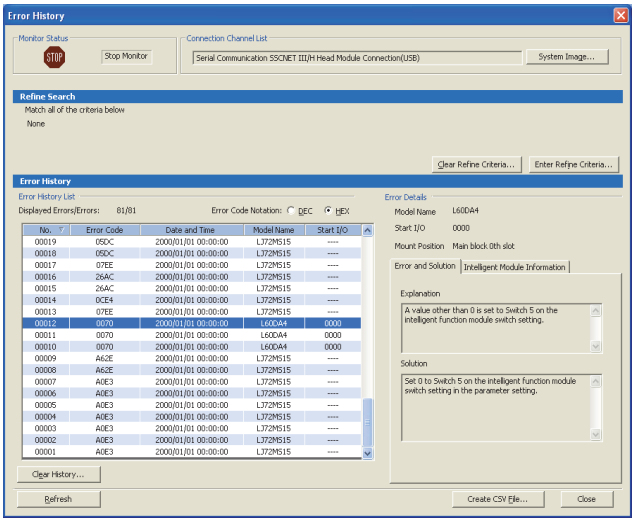
4. If data link is not available even after troubleshooting by the above operation, perform the following.

- Checking with SSCNET III Communication Condition Monitor by connecting MT Developer2 to the Motion controller (☞ Page 76, CHAPTER 9)
- Checking the LEDs (☞ Page 88, Section 11.4)
- Troubleshooting by Symptom (☞ Page 90, Section 11.5)

(b) Checking for failure of a module other than the head module


Module's Detailed Information
Displays the latest error code.
Displays the error history.
Displays the details and solution of the error code that is selected in the error history.

1. **Select a module other than the head module in the "System Monitor" window, and click the Diagnostics or Detailed Information button to view the diagnostics or detailed information.**



2. **Reset of the head module and errors occurred before power off can be checked in the "Error History" window.**

[Diagnostics] ⇨ [System Monitor] ⇨ System Error History button

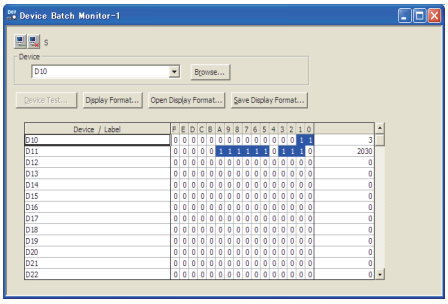
In the single "Error History" window, the error history of the head module and intelligent function modules can be viewed. (☞ Page 86, Section 11.3)

3. **If data link is not available even after troubleshooting by the above operation, perform the following.**

- Checking the LEDs (☞ Page 88, Section 11.4)
- Troubleshooting by Symptom (☞ Page 90, Section 11.5)

Remark

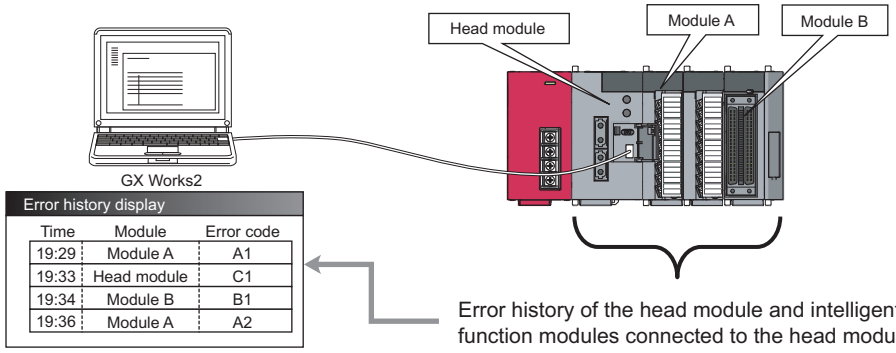
By specifying the monitor device in the parameter setting of the Motion controller, the operating status including the error code of an error which has occurred in the head module can be checked by the Device Batch Monitor of the Motion controller. (📖 MT Developer2 Help)



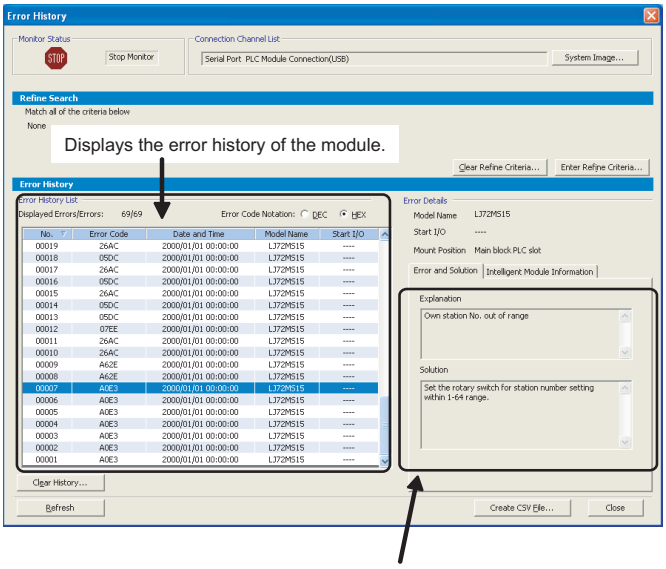
11.3 System Error History

The history of the errors that occurred in the past can be checked so that corrective actions can be taken for each of them. Reset of the head module and errors occurred before power off can be also checked. On a single screen, error history of not only the head module but also the intelligent function modules installed with the head module can be checked.

Data of up to 100 errors can be collected. (Once the number of collected error logs exceeds 100, the oldest error logs and sequentially thereafter will be deleted.)


Head module
Module A
Module B
GX Works2
Error history display
Time Module Error code
19:29 Module A A1
19:33 Head module C1
19:34 Module B B1
19:36 Module A A2
Error history of the head module and intelligent function modules connected to the head module

(1) Checking the error history


Error History
Displays the error history of the module.
Displays the details and solution of the error selected in "Error History List."

1. **Open the "Error History" window of GX Works2.**

[Diagnostics] ⇨ [System Monitor] ⇨ System Error History button

The error history is displayed. Check the error and solution and troubleshoot the problem.

Point

- If error code 9900 is detected, check the error and solution of error code A***H detected at the same time to troubleshoot the problem. Concurrently with error code 9900, error code A***H is also detected.
- If the same error occurred continuously, only the first error record is displayed in the "Error History" window.
- Selecting a module in the "Main Block" area in "System Monitor" and clicking the Error History Detail button will also open the "Error History" window. In this case, only the error history of the module selected in "Main Block" is displayed. For details on errors of intelligent function modules, refer to the following. (📖 User's manual for the intelligent function module used)

(2) Precautions

(a) The time and date of the error are not correctly displayed.

- Check if the Motion controller is connected to the head module. The head module collects time information from the Motion controller every time the module is connected to SSCNET III/H. If the Motion controller is not connected to the head module, the time and date of errors will not be displayed correctly. (Initial value: 2000/01/01 00:00:00)
- After the clock information has been acquired from the Motion controller, when the head module is powered off then on, the clock resumes from the time when the power was last turned off. (The clock pauses during power off.) Therefore, the data and time of an error that occurred during initial processing may be different from the actual one.

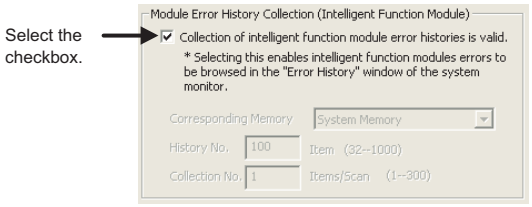
(b) The error is not correctly displayed.

If errors occurred frequently, "*HST.LOSS*" may be displayed in the "Error Code" column, instead of an error code.

No.	Error Code	Date and Time	Model Name	Start I/O
00019	*HST.LOSS*	2000/01/01 00:00:00	LJ72MS15	----
00018	05DC	2000/01/01 00:00:00	LJ72MS15	----

(c) No error history is displayed.

In "PLC RAS" of PLC Parameter, check if the "Module Error History Collection (Intelligent Function Module)" is selected. This setting is enabled by performing "Write to PLC" in GX Works2 and resetting the head module or turning off and then on the power.


Select the checkbox.
Module Error History Collection (Intelligent Function Module)
Collection of intelligent function module error histories is valid.
* Selecting this enables intelligent function modules errors to be browsed in the "Error History" window of the system monitor.
Corresponding Memory
System Memory
History No.
100
Item (32--1000)
Collection No.
1
Items/Scan (1--300)

Point

If the check box in "Module Error History Collection (Intelligent Function Module)" is cleared, error history data of intelligent function modules are not collected.
Clear the check box if a higher operation speed is desired for the head module.

11.4 Checking the LEDs

The following describes how to troubleshoot the system by the LEDs.

(1) When the RUN LED turned off

Check item	Action
Is the head module installed correctly?	Connect the head module to the power supply module again.

If the above action does not solve the problem, perform the unit test on the head module to check for a hardware error. (☞ Page 43, Section 6.4)

(2) When the RUN LED is flashing

Check item	Action
Is the switch of the head module set to RUN?	Set the switch of the head module to RUN to start data link.
Is it in the remote STOP status?	Cancel the remote STOP and start data link.
Has an error occurred in the head module?	From "System Monitor" in GX Works2, identify the cause of the error and take action. (☞ Page 82, Section 11.2)
Is the Motion controller in the RUN status?	Set the Motion controller to the RUN status. If the Motion controller has stopped due to an error, troubleshoot it referring to the manual for the Motion controller. (📖 User's manual for the Motion controller used)
Was the head module disconnected during STOP of the Motion controller?	• Set the Motion controller to the RUN status and reconnect the head module to the network. • Reset the head module because it retains the STOP status of the Motion controller.

(3) When the ERR. LED turned on

Identify the cause of the error in GX Works2 and take action. (☞ Page 82, Section 11.2)

(4) When the ERR. LED is flashing

Check item	Action
Is the station number set within the range of 1 to 64?	Set the station number within the range of 1 to 64.

(5) When the L ERR. LED turned on

Check item	Action
Appropriate SSCNET III cables are used?	• Check that Mitsubishi SSCNET III cables are used. (📖 User's manual for the Motion controller used) • Check if the station-to-station distance is 50m or less. • Check if the SSCNET III cables are not disconnected.
Do other stations connected to the head module normally operate?	Check if the systems on other stations are on.
Does the set station number correspond with the setting configured in the Head Module window of MT Developer2?	Check the station number setting of each module in the Head Module window of MT Developer2. If a station number different from the setting is set, power off the head module to correct the station number then power on the module again.
Is there any noise affecting the system?	Check the wiring condition.

If the above action does not solve the problem, perform the unit test on the head module to check for a hardware error. (☞ Page 43, Section 6.4)

(6) When the REM. LED turned off

Check item	Action
Has an error occurred in the head module?	From "System Monitor" in GX Works2, identify the cause of the error and take action. (☞ Page 82, Section 11.2)

(7) When the REM. LED is flashing

Check item	Action
Are any forced I/O data being registered?	Cancel the registration.
After execution of "Write to PLC", was the head module reset?	Reset the head module.

11.5 Troubleshooting by Symptom

Troubleshooting methods are described by symptom. Perform these troubleshooting actions when cyclic and/or transient transmissions are not possible with the target station even though no error is detected in the head module. If an error has occurred in an intelligent function module installed with the head module, identify the cause of the error by GX Works2. (☞ Page 82, Section 11.2)

Point

- Before starting the troubleshooting by symptom, check that the POWER LED of the power supply module is on. For troubleshooting of the power supply module, refer to 🕮 MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).
- When the troubleshooting by symptom cannot solve the problem: Perform the unit test on the head module to check for a hardware error. (☞ Page 43, Section 6.4)

11.5.1 Cyclic transmission cannot be performed.

When cyclic data are not delivered to other stations, or when cyclic data from the Motion controller cannot be received, use the following troubleshooting methods.

Check item	Action
Is the REM. LED of the head module on?	If the REM.LED is flashing or off, perform the troubleshooting by the LEDs. (☞ Page 88, Section 11.4)
Are the I/O assignment settings of PLC parameter correct?	Set the I/O assignment correctly. (☞ Page 62, Section 7.1 (6))
Is the switch of the head module set to "RUN"?	Set the switch of the head module to "RUN".
Is the RUN LED of the head module on?	If the RUN LED is flashing or off, perform the troubleshooting by the LEDs. (☞ Page 88, Section 11.4)

If the above actions do not solve the problem, check if there is any error in the refresh device setting for the CPU module configured by the Motion controller. (🕮 Programming Manual (COMMON) for the Motion controller used)

11.5.2 Transient transmission cannot be performed.

If transient transmissions are not executable with the target station, check that the station numbers set with the rotary switches of the head module are set correctly. (☞ Page 20, CHAPTER 2)

11.6 Error Code List

This section describes error messages, error conditions, causes, and actions for respective error codes of the head module.

Errors of the head module are classified by error codes as shown below.

Error code	Classification	Reference
1 to 10000	Errors of the head module	Page 92, Section 11.6 (1)
4000H to 4FFFH	Error codes returned to the request source at communications	Page 97, Section 11.6 (2)
A000H to AFFFH	Errors of SSCNET III/H	Page 97, Section 11.6 (3)

(1) Error code list (1 to 10000)

The following lists the error messages, error conditions, causes, and actions of the error codes (1 to 10000).

The "■Supplementary information" in the "Error and cause" column can be confirmed by any of the following.

- PLC Diagnostics in GX Works2
- Common error information (SD5 to SD15)
- Individual error information (SD16 to SD26)

Error code	Error and cause	Action
1000 1001 1002 1003 1004 1005 1006 1009 1035	[HEAD UNIT DOWN] The head module is running away or faulty. • Malfunction due to noise • Hardware failure **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • Any time	Take action against noise, and reset the module. If this error occurs again, the hardware of the head module may be faulty. (Please consult your local Mitsubishi representative.)
1090	[HEAD UNIT DOWN] The head module is running away or faulty. • Malfunction due to noise • Hardware failure **■Supplementary information** • Common information: — • Individual information: Breakdown information **■Diagnostic timing** • Any time	Take action against noise, and reset the module. If this error occurs again, the hardware of the head module may be faulty. (Please consult your local Mitsubishi representative.)
1101 1102 1103 1104	[RAM ERROR] The RAM built in the head module is faulty. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • When powered on or reset	Take action against noise, and reset the module. If this error occurs again, the hardware of the head module may be faulty. (Please consult your local Mitsubishi representative.)
1161	[RAM ERROR] The data in the device memory built in the head module were overwritten. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • Any time	Take action against noise, and reset the module. If this error occurs again, the hardware of the head module may be faulty. (Please consult your local Mitsubishi representative.)
1310	[I/O INT. ERROR] An interrupt occurred even though there is no module that can issue an interrupt. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • When an interrupt occurred	The hardware of any of the installed modules is faulty. Check the installed modules, and replace the faulty module. (Please consult your local Mitsubishi representative.)
1311	[I/O INT. ERROR] An interrupt request from a module installed with the head module was detected. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • When an interrupt occurred	The hardware of any of the installed modules is faulty. Check the installed modules, and replace the faulty module. (Please consult your local Mitsubishi representative.)

Error code	Error and cause	Action
1401	[SP. UNIT DOWN] • In the initial processing, no response is returned from the intelligent function module. • The buffer memory size of the intelligent function module is abnormal. • A module which is not supported is connected. • No response is returned from the intelligent function module. • When the error occurs, the start I/O number of the corresponding intelligent function module is stored in the common information area. **■Supplementary information** • Common information: Module No. (Slot No.) • Individual information: — **■Diagnostic timing** • When powered on, reset, or accessing an intelligent function module	When a module which is not supported is connected, disconnect the module. When the connected module is supported, reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
1403	[SP. UNIT DOWN] • No response is returned from the intelligent function module. • An error occurred in an intelligent function module was detected. • Any of the I/O modules (including intelligent function modules) is being disconnected during its operation, or was disconnected. **■Supplementary information** • Common information: Module No. (Slot No.) • Individual information: — **■Diagnostic timing** • Any time	When a module which is not supported is connected, disconnect the module. When the connected module is supported, reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
1500	[AC/DC DOWN] • Momentary supply power failure occurred. • The supply power turned off. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • Any time	Check the supply power.
1610	[FLASH ROM ERROR] The number of writes to the flash ROM exceeded 100,000 times. (Number of writes > 100,000) **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • When writing data to ROM	• Replace the head module. • In "Communication Head Setting" of PLC Parameter, clear the check box so that data of the error history and system error history will not be held at the time of power off or reset.
1700	[BUS TIMEOUT ERR.] Failure of the system bus was detected. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • Any time	Reset the head module. If this error occurs again, this module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
1710	[UNIT BUS ERROR] • Failure of the system bus was detected. • Failure of a connected module was detected. **■Supplementary information** • Common information: — • Individual information: — **■Diagnostic timing** • Any time	

Error code	Error and cause	Action
1720	[END COVER ERR.] Failure of the END cover was detected. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • When powered on or reset	• Replace the END cover. • Reset the head module. If this error occurs again, the hardware of the head module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
1730	[SYSTEM RST ERR.] Failure of the system bus was detected. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • When powered on or reset	
2030	[NO END COVER] There is no END cover. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • When powered on or reset	• Install an END cover. • Check if the modules are correctly connected, referring to the configuration of the modules in the System Monitor dialog box. • Reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
2031	[NO END COVER] There is no END cover. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • Any time	
2040	[UNIT BAD CONNECT] • The information is different from the I/O module information at the time of power on. • Any of the I/O modules (including intelligent function modules) is being disconnected during its operation, or was disconnected. ■**Supplementary information** • Common information: Module No. (Slot No.) • Individual information: — ■**Diagnostic timing** • Any time	• Read common information on the error using GX Works2, check the module corresponding to the value (module No.), and replace the module. • Monitor SD1400 to SD1431 on GX Works2, check the module corresponding to the bit indicating "1", and replace the module. • Reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
2100	[SP. UNIT LAY ERR.] • In "I/O Assignment" of PLC Parameter, "Intelligent" is set for the position of an I/O module. Or vice versa. • In "I/O Assignment" of PLC Parameter, the intelligent function module switch setting is set for the module that does not support it. • In "I/O Assignment" of PLC Parameter, the number of points smaller than that of the actual intelligent function module is assigned. ■**Supplementary information** • Common information: Module No. (Slot No.) • Individual information: — ■**Diagnostic timing** • When powered on or reset	• Correct the I/O Assignment setting of PLC Parameter, according to the actual condition of the intelligent function module(s) and head module. • In "I/O Assignment" of PLC Parameter, delete the intelligent function module switch settings.
2107	[SP. UNIT LAY ERR.] A start X/Y set in "I/O Assignment" of PLC Parameter is overlapped with that of another module. ■**Supplementary information** • Common information: Module No. (Slot No.) • Individual information: — ■**Diagnostic timing** • When powered on or reset	Correct the I/O Assignment setting of PLC Parameter, according to the actual condition of the intelligent function module(s) and I/O module(s).

Error code	Error and cause	Action
2124	[SP. UNIT LAY ERR.] • The number of connected modules exceeded 10. • A module is installed in the position corresponding to the I/O points of 4096 or greater. • A module is installed across the boundary of 4096 I/O points. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • When powered on or reset	• Reduce the number of connected modules to 10 or less. • Remove the module installed in the position corresponding to the I/O points of 4096 or greater. • Replace the end module with a module so that the number of occupied points does not exceed 4096. • Reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
2125	[SP. UNIT LAY ERR.] • An inappropriate module was installed. • No response is returned from the intelligent function module. ■**Supplementary information** • Common information: Module No. (Slot No.) • Individual information: — ■**Diagnostic timing** • When powered on or reset	• Install an appropriate module. • Reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
2170	[SYSTEM LAY ERR.] An inappropriate module was installed. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • When powered on or reset	• Disconnect the inappropriate module. • Reset the head module. If this error occurs again, the hardware of the head module, I/O module, intelligent function module, or END cover may be faulty. (Please consult your local Mitsubishi representative.)
3000	[PARAMETER ERROR] In PLC Parameter, the number of points for empty slots is not set within the range allowed for the head module. ■**Supplementary information** • Common information: File name/Drive name • Individual information: Parameter No. ■**Diagnostic timing** • When powered on or reset, or when writing to PLC	• Read detailed error information using GX Works2, and check and correct the parameter corresponding to the value (parameter No.). • Write the corrected parameters to the head module again, and reset or reapply power to the head module. If this error occurs again, the hardware of the head module may be faulty. (Please consult your local Mitsubishi representative.)
3001	[PARAMETER ERROR] The parameters are corrupted. ■**Supplementary information** • Common information: File name/Drive name • Individual information: Parameter No. ■**Diagnostic timing** • When powered on or reset, or when writing to PLC	• Read detailed error information using GX Works2, and check and correct the parameter corresponding to the value (parameter No.). • Write the corrected parameters to the head module again, and reset or reapply power to the head module. If this error occurs again, the hardware of the head module may be faulty. (Please consult your local Mitsubishi representative.)
3004	[PARAMETER ERROR] The parameter file is incorrect. Or, the contents of the file are not parameters. ■**Supplementary information** • Common information: File name/Drive name • Individual information: Parameter No. ■**Diagnostic timing** • When powered on or reset, or when writing to PLC	Check if the type of the parameter file is shown as "***.QPA" and if the file contains parameters.
3300	[SP. PARA ERROR] The start I/O number for the intelligent function module set in GX Works2 is different from the actual one. ■**Supplementary information** • Common information: File name/Drive name • Individual information: Parameter No. ■**Diagnostic timing** • When powered on or reset, or when writing to PLC	Correct the parameter setting.
3301	[SP. PARA ERROR] • Auto refresh parameters for the intelligent function module are out of range. • The intelligent function module set in GX Works2 is different from the actually installed module. ■**Supplementary information** • Common information: File name/Drive name • Individual information: Parameter No. ■**Diagnostic timing** • When powered on or reset, or when writing to PLC	Correct the parameter setting.

Error code	Error and cause	Action
3302	[SP. PARA ERROR] Intelligent function module parameters are not normal. ■**Supplementary information** • Common information: File name/Drive name • Individual information: Parameter No. ■**Diagnostic timing** • When powered on or reset, or when writing to PLC	Correct the parameter setting.
5000 5001	[WDT ERROR] • I/O refresh processing time exceeded 200ms. • Momentary power failure occurred frequently. ■**Supplementary information** • Common information: Time (200ms) • Individual information: Time (value actually measured) ■**Diagnostic timing** • Any time	Modify the power supply system to prevent momentary power failure.
9900	[NETWORK ERROR] A SSCNET III/H error has occurred. ■**Supplementary information** • Common information: — • Individual information: — ■**Diagnostic timing** • Any time	• Check the detailed module failure by the SSCNET III Communication Condition Monitor of MT Developer2, and take action according to the display. • In the system error history of System Monitor, confirm the error code of the network error detected at the time.

(2) Error code list (4000H to 4FFFH)

If an error occurs at communication request from GX Works2 or an intelligent function module, the head module returns the error code (any of 4000H to 4FFFH) to the request source. This error code is not stored in SD0 because the error is not the one detected by the self-diagnostic function of the head module.
When the request source is GX Works2, a message and an error code are displayed on GX Works2. When the request source is an intelligent function module, the head module returns an error code to the request source.

For messages, details, causes, and actions of errors, refer to the following.
📖 User's Manual for the programmable controller CPU used (Hardware Design, Maintenance and Inspection)

(3) Error code list (A000H to AFFFH)

The following lists the error messages, error conditions, causes, and actions of the error codes (A000H to AFFFH).

Error code	Error	Action
A0B0	Not supported Motion SFC request is received.	• At the Motion controller side, set the Motion SFC request destination to station other than the head module. • At the Motion controller side, change the Motion SFC command to the one supported by the head module.
A0B1	Not supported Motion SFC request is received.	• Set the Motion SFC request destination to station other than the head module. • At the Motion controller side, change the Motion SFC command to the one supported by the head module.
A0B3	Start I/O number of RTO/RFROM command is out of range.	Set the start I/O number of the target module correctly using the Motion SFC programs.
A0B4	There is no buffer memory in the target module specified by the Motion SFC programs.	• Set the start I/O number of the module which has a buffer memory using the Motion SFC programs. • At head module side, install an intelligent function module which has a buffer memory to the start I/O number specified by the Motion SFC programs.
A0B5	Buffer memory address specified by the Motion SFC programs is out of range.	Set the buffer memory address specified by the Motion SFC programs within the range.
A0B7	Module is not installed to the start I/O number specified by the Motion SFC programs.	• Set start I/O number where the module is installed using the Motion SFC programs. • Install the intelligent function module to the start I/O number specified by the Motion SFC programs.
A0B8	Target module access failure	• Confirm the installation condition of the intelligent function module of the communication target, then execute the communication again with the target intelligent function module using Motion SFC programs. • If the error occurs again, exchange the intelligent function module of the communication target.
A0B9	Target module access failure	• Confirm the installation condition of the intelligent function module of the communication target, then execute the communication again with the target intelligent function module using Motion SFC programs. • If the error occurs again, exchange the intelligent function module of the communication target.
A0BD	Time information mismatch	Correct the time information setting at the Motion controller side and write it again. (Time information of the head module will be updated when reconnecting with the Motion controller)
A0E3	Own station No. out of range	Set the station number setting switch within 1 to 64 range.
A62E	Motion controller lost	Communication with the Motion controller was lost. • Check if there are overlapping station numbers in the network. • Check if 0 (for reservation) is set for the axis No. corresponding to the station number of own station. • Check that the station number of the head module corresponds with the setting in the Head Module window of MT Developer2. • Check that no error has occurred in the Motion controller by connecting or disconnecting cables during communication. • Check the wiring for cable disconnection.

Error code	Error	Action
AA15	Head module failure	• A malfunction may have occurred due to noise. Check the wire and cable distances and grounding condition of each device, and take measures against noise. • Execute a unit test for the head module. If a failure is detected again, the hardware of the head module may be faulty. Please consult your local Mitsubishi representative.
AAF2	Flash ROM failure	• If the number of times that data were written to the flash ROM exceeded 100,000, clear the check box in "Communication Head Setting" of PLC Parameter so that data of the error history and system error history will not be held at the time of power off or reset. • Check the wire and cable distances and grounding condition of each device, and take measures against noise. • Execute a unit test for the head module. If a failure is detected again, the hardware of the head module may be faulty. Please consult your local Mitsubishi representative.
AAF3	Flash ROM failure	• A RAM error may have occurred due to noise. Check the wire and cable distances and grounding condition of each device, and take measures against noise. • Execute a unit test for the head module. If a failure is detected again, the hardware of the head module may be faulty. Please consult your local Mitsubishi representative.
AB00	Head module failure	• A malfunction may have occurred due to noise. Check the wire and cable distances and grounding condition of each device, and take measures against noise. • Execute a unit test for the head module. If a failure is detected again, the hardware of the head module may be faulty. Please consult your local Mitsubishi representative.

Memo

APPENDICES

Appendix 1 Forced On/Off for External I/O

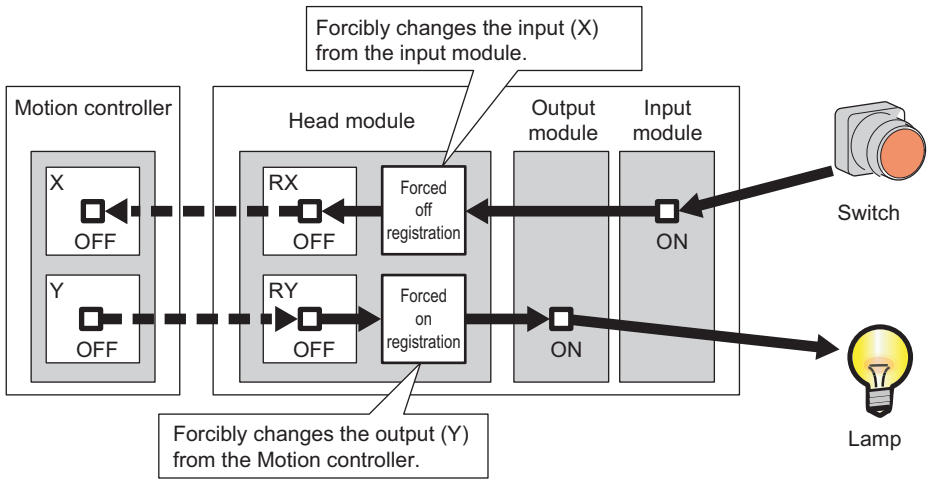
This section describes the function that forcibly turns on or off the external input/output of the head module.

(1) Input/output operation when a forced on/off operation is performed

Three types of forced on/off operations are available as shown in the following table. The following table shows the status of input (X) and output (Y) when a forced on/off operation is performed.

Operation	Input (X) operation	Output (Y) operation
Forced on registration	The remote input (RX) assigned to input (X) is transmitted cyclically in a forced on-status.	Regardless of the remote output (RY) that was transmitted cyclically, "ON" is output externally.
Forced off registration	The remote input (RX) assigned to input (X) is transmitted cyclically in a forced off-status.	Regardless of the remote output (RY) that was transmitted cyclically, "OFF" is output externally.
Forced on/off clear	The remote input (RX) is changed by an external input.	The remote output (RY) of the Motion controller is output to the external device.

Ex The following shows the input/output operation when a forced on/off operation is performed.



(a) Number of devices that can be registered

Up to 32 devices in total can be registered.

(b) Checking the execution status

- "Forced Input Output Registration/Cancellation" window of GX Works2
- The on status of the 0 bit in debug function usage (SD840)

(c) Status of devices after forced on/off registration data are canceled

When the on/off registration information of the following input (X) and output (Y) are canceled, the forced on/off status is retained.

- Output (Y) that is outside the range that was set in "RX Link Device" and "RY Link Device" of the Head Module window of MT Developer2

(d) Status of the Head Module

The REM. LED of head module flashes.

Forced on/off can be registered regardless of the RUN/STOP status.

If an error occurs in the head module, output (Y) cannot be turned on.

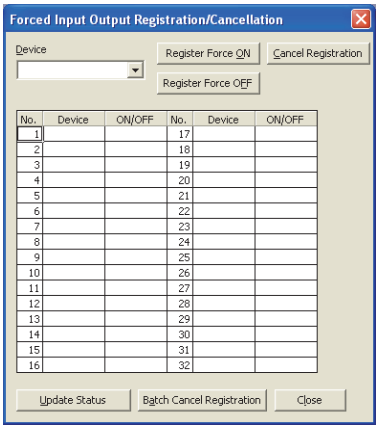
(e) Target input/output

- Input/output (X/Y) of the connected modules

(2) Operating procedure

1. Open the "Forced Input Output Registration/Cancellation" window.

[Debug] ⇨ [Forced Input Output Registration/Cancellation...]



2. Enter the target device to the "Device" column.

The setting range in the "Device" column is X0 to X1FFF or Y0 to Y1FFF.

3. Click the button for the intended operation.

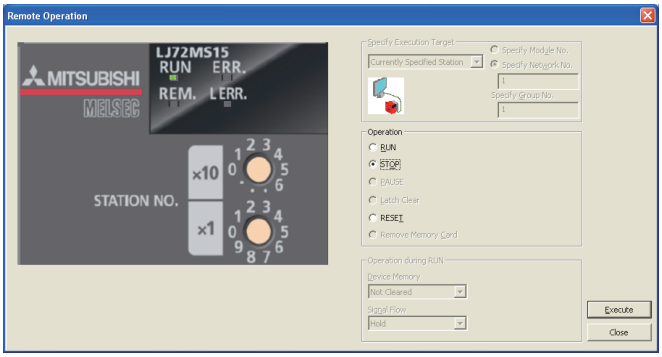
Button name	Description	Button name	Description
Register Force ON	Registers forced on for a specified device.	Cancel Registration	Cancels forced on/off registered for the device specified.
Register Force OFF	Registers forced off for a specified device.	Batch Cancel Registration	Cancels all forced on/off registrations.

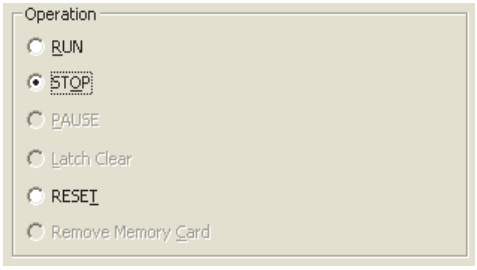
The latest on/off status can be checked by clicking the Update Status button.

Memo

Appendix 2 Remote Operation

Remote operation (RUN, STOP, and RESET operations) can be performed from GX Works2 to the head module.





1. Connect GX Works2 to the head module.

2. Display the "Remote Operation" window from the menu of GX Works2.

[Online] ⇨ [Remote Operation...]

3. Select a remote operation to the head module in "Operation".

- RUN: Sets the head module to the RUN mode. The communication with the Motion controller continues when it is possible and the link devices are refreshed.
- STOP: Sets the head module to the STOP mode. The communication with the Motion controller continues when it is possible. However, the link devices are not refreshed.
- RESET: Resets the head module. This operation can be selected only when a parameter for which "Remote Reset" is set to "Allow" in "PLC System" of PLC Parameter has been written. However, remote reset is not allowed with parameter. Or remote reset is allowed with parameter, but the head module is in the RUN status.

4. Click the Execute button to perform the remote operation.

Point

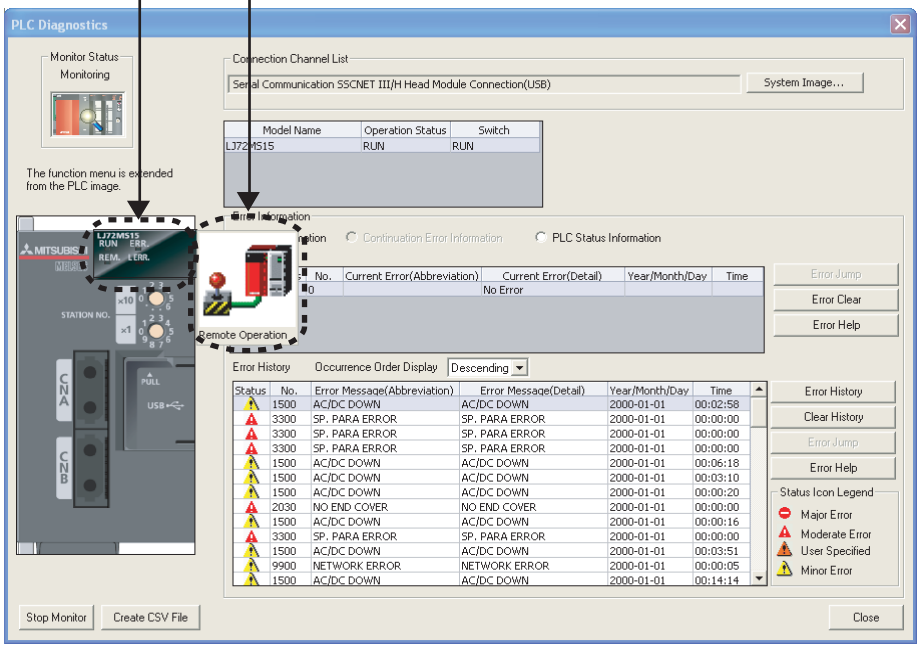
The remote operation can be performed only from GX Works2 directly connected to the head module with a USB cable.
The remote operation cannot be performed via the network connection.

Remark

The "Remote Operation" window can be displayed from the "PLC diagnostics" window of GX Works2 as well. (☞ Page 82, Section 11.2)

1. Put the cursor on the LED display.

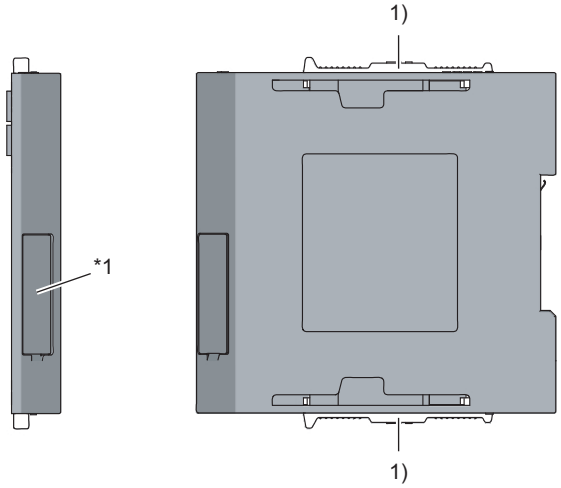
2. Click "Remote Operation" displayed on the right.



Appendix 3 END Cover

This section describes the specifications of the END cover.
For specifications of the END cover with ERR terminal (L6EC-ET), refer to the following.
MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

(1) Part names



*1 Do not remove this label as it is for maintenance.

No.	Name	Application
1)	Module joint levers	Levers for connecting modules each other.

(2) Specification

Item		L6EC
External dimensions	H	90mm
	W	13mm
	D	95mm
Internal current consumption		0.04A
Weight		0.06kg

Memo

Appendix 4 Link Special Relay (SB) List

The link special relay (SB) is turned on/off depending on various factors occurred in data link. Any error status of the data link can be confirmed by monitoring it.

(1) Areas turned on/off by the system and a user

- Areas turned on/off by the system: SB0000 to SB0005, SB0007 to SB1FFF
- Area turned on/off by a user: SB0006

(2) Link special relay (SB) list

The following lists link special relays (SB).

Point

Do not turn on/off an area whose number is not on the link special relay (SB) list. Doing so may cause malfunction of the programmable controller system.

No.	Name	Description
SB0006	Clear of number of communication errors	Clears the number of communication errors. OFF: No clear ON: Clear (While it is on, new errors are not counted but cleared.)
SB0043	Mode switch information (own station)	Stores the mode switch information of own station. OFF: Online ON: Other than online
SB0049	Data link status (own station)	Stores the data link status of own station. (After the refresh is completed, the status is indicated.) OFF: Data link in progress ON: Data link stopped
SB004A	Own station status (1)	Stores the self-diagnostics results of own station. The result is used on the network when a request from other stations is accepted. OFF: Normal ON: Minor error occurred
SB004B	Own station status (2)	Stores the self-diagnostics results of own station. The result is used on the network when a request from other stations is accepted. OFF: Normal ON: Moderate or major error occurred
SB004C	RUN status (own station)	Stores the RUN status of own station. OFF: RUN ON: STOP, ERROR
SB006C	Error frame reception status on CNA (own station)	Stores the current occurrence status of a frame receiving error on CNA of own station. OFF: No frame receiving error ON: Frame receiving error occurred
SB006D	Error frame reception status on CNB (own station)	Stores the current occurrence status of a frame receiving error on CNB of own station. OFF: No frame receiving error ON: Frame receiving error occurred
SB006E	Error frame reception detection status on CNA (latch)	Indicates whether or not a frame receiving error has ever occurred on CNA of own station since the power was on. OFF: No frame receiving error ON: Frame receiving error occurred
SB006F	Error frame reception detection status on CNB (latch)	Indicates whether or not a frame receiving error has ever occurred on CNB of own station since the power was on. OFF: No frame receiving error ON: Frame receiving error occurred

Memo

Appendix 5 Link Special Register (SW) List

In the link special register (SW), data link information is stored as numerical values. By monitoring it, faulty areas and their causes can be checked.

(1) Areas to which data are stored by the system and a user

- Areas to which data are stored by the system: SW0000 to SW1FFF
- Area to which data are stored by a user: None

(2) Link special register (SW) list

The following lists link special registers (SW).

Point

Do not write any data to an area whose number is not on the link special register (SW) list. Doing so may cause malfunction of the programmable controller system.

No.	Name	Description
SW0042	Station No.	Stores the station number of own station. Range: 1 to 64, 0000H (Out-of-range station No.)
SW0043	Mode status	Stores the mode of own station. 0: Online 2: Offline 9: Unit test
SW0047	Communication status (own station)	Stores the communication status of own station. 0: Data link in progress 2: Data link stopped 5: Offline
SW0048	Cause of communication interruption	Stores the cause of interruption in the communication of own station. 00H: At normal communication or power-on 33H: Disconnection or reconnection in progress 40H: Offline mode
SW0049	Cause of data link stop	Stores the cause which stopped the data link of own station. 00H: At normal communication or power-on 02H: Data link monitoring timer timeout 10H: Parameter not received 18H: Parameter error 19H: Parameter communication in progress 20H: Error detected
SW004B	Module status (own station)	Stores the head module status of own station. 01H: STOP (Normal) 02H: STOP (Stop error) 03H: STOP (Continuation error) 04H: RUN (Normal) 05H: RUN (Continuation error) 0FH: Initial processing
SW0064	Connection status (own station)	Stores the connection status of own station. 00H: Normal (communication in progress on CNA and CNB) 01H: Normal (communication in progress on CNA, communication not in progress on CNB) 11H: Disconnecting (communication not in progress on CNA or CNB) 21H: Disconnecting (establishing line on CNA, communication not in progress on CNB) 22H: Disconnecting (establishing line on CNA and CNB)

Memo

Appendix 6 Special Relay (SM) List

The special relay (SM) is an internal relay whose application is fixed in the programmable controller. However, it can be turned on/off as needed to control the head module.

The following table shows how to read the special relay list.

Item	Description
No.	Special relay number
Name	Special relay name
Description	Contents of special relay
Details	Detailed description of special relay
Set by (Set timing)	Set side and set timing of special relay <Set by> • S: Set by system. • U: Set by the user (via network or by test operation of GX Works2). • S/U: Set by both system and user. <Set timing> The following shows the set timing when the special relay is set by system. • Initial: Set during initial processing (after power-on or reset). • Status change: Set when the operating status is changed. • On error: Set if an error occurs. • Write: Set when data is written to the module.

Point

Do not change the value of any special relay set by the system using test operation, etc. Doing so may result in system down or communication failure.

(1) Diagnostic information

No.	Name	Description	Details	Set by (Set timing)
SM0	Diagnostic error	OFF: No error ON: Error occurs	• Turns on if the diagnostics results in an error. • Stays on even if the normal state is restored.	S (On error)
SM1	Self-diagnostic error	OFF: No self-diagnostic error ON: Self-diagnostic error occurs	• Turns on if the self-diagnostics results in an error. • Stays on even if the normal state is restored.	
SM5	Common error information	OFF: No common error information ON: Common error information exists	Turns on if there is any common error information when SM0 turns on.	
SM16	Individual error information	OFF: No individual error information ON: Individual error information exists	Turns on if there is any individual error information when SM0 turns on.	
SM50	Error clear	OFF→ON: Error clear	Clears an error.	U
SM53	AC/DC Down detection	OFF: No AC/DC Down ON: AC/DC Down detected	When using AC power supply modules, this turns on if a power outage of 10ms or less occurs. This is reset by powering off and on.	S (On error)
			When using DC power supply modules, this turns on if a power outage of 10ms or less occurs. This is reset by powering off and on.	
SM61	I/O module verify error	OFF: Normal ON: Error occurs	• Turns on if the status of the I/O module when powered on is different from the registered status. • Stays on even if the normal state is restored.	

(2) System clock/counter

No.	Name	Description	Details	Set by (Set timing)
SM400	Always ON	ON —————— OFF	Always turns on.	S (Initial)
SM401	Always OFF	ON OFF ——————	Always turns off.	

(3) Drive information

No.	Name	Description	Details	Set by (Set timing)
SM681	Parameter memory writing flag	ON: Write in progress OFF: Write not in progress	Turns on when writing parameters to the flash ROM, and turns off when writing completes.	S (Write)
SM682	Parameter memory overwrite count error flag	ON: Rewrite count reached 100 thousand OFF: Rewrite count less than 100 thousand	Turns on when the rewrite count of parameters to the flash ROM reaches 100 thousand. (The head module should be changed.)	

Appendix 7 Special Register (SD) List

The special register (SD) is an internal register whose application is fixed in the programmable controller. However, data can be written to the special register to control the head module as needed. Data is stored in binary format if not specified.

The following table shows how to read the special register list.

Item	Description
No.	Special register number
Name	Special register name
Description	Contents of special register
Details	Detailed description of special register
Set by (Set timing)	Set side and set timing of special register <Set by> • S: Set by system. • U: Set by the user (via network or by test operation of GX Works2). • S/U: Set by both system and user. <Set timing> The following shows the set timing when the special register is set by system. • Initial: Set during initial processing (after power-on or reset). • Status change: Set when the operating status is changed. • On error: Set if an error occurs. • Switch change: Set when the switch has changed. • Write: Set when data is written to the module.

Point

Do not change the value of any special register set by the system using operations such as device test. Doing so may result in system down or communication failure.

(1) Diagnostic information

No.	Name	Description	Details	Set by (Set timing)
SD0	Diagnostic error	Diagnostic error code	• Stores the error code for the error that occurred during diagnostics. • This is the same data as the latest information in error history and system error history.	S (On error)
SD1	Clock time of diagnostic error occurrence	Clock time of diagnostic error occurrence	Stores the year (last 2 digits) and month (2 digit BCD code) the SD0 data was updated. b15 to b8 b7 to b0 Year (0 to 99) | Month (1 to 12) (Example) January, 2010 1001H The clock of the head module synchronizes with that of the Motion controller. (☞ Page 25, Section 3.2)	
SD2			Stores the date and hour (2 digit BCD code) the SD0 data was updated. b15 to b8 b7 to b0 Day (1 to 31) | Hour (0 to 23) (Example) 10 a.m. on 25th 2510H The clock of the head module synchronizes with that of the Motion controller. (☞ Page 25, Section 3.2)	
SD3			Stores the minute and seconds (2 digit BCD code) the SD0 data was updated. b15 to b8 b7 to b0 Minutes (0 to 59) | Seconds (0 to 59) (Example) 35 min. 48 sec. 3548H The clock of the head module synchronizes with that of the Motion controller. (☞ Page 25, Section 3.2)	
SD4	Error information category	Error information category code	• Stored to common information (SD5 to SD15) and individual information (SD16 to SD26), respectively. • Stores the category code that determines what the error information is. b15 to b8 b7 to b0 Individual information category codes | Common information category codes • The following codes are stored in the common information category code. • 0: None • 1: Module No. (Slot No.) • 2: File name/drive name • 3: Time (Set value) • The following codes are stored in the individual information category code. • 0: None • 1: (Empty) • 2: File name/drive name • 3: Time (Actual measurement value) • 4: None • 5: Parameter No. • 6: None • 7: None • 8: None • 9: Malfunction information •12: File diagnostic information • 13: None	S (On error)

<table>
<tr><th>No.</th><th>Name</th><th>Description</th><th>Details</th><th>Set by
(Set timing)</th></tr>
<tr><td>SD5
SD6
SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>Common error information</td><td>Common error information</td><td>
• Stores common information corresponding to the error code (SD0).
• There are three types of information that are stored.
• The type of error common information can be identified by SD4 "common information category code". (The values of "common information category code" stored in SD4 correspond to items 1) to 3) below.)
1) Module No.
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD5</td><td>Slot No. ∗1, ∗2</td></tr>
<tr><td>SD6</td><td>I/O No.∗3</td></tr>
<tr><td>SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>(Empty)</td></tr>
</table>
*1 The slot number is defined as follows:
[Slot No.]
This value identifies the connected module.
The module connected to the right of the head module is considered "Slot No. = 0", and the rest of the modules are numbered incrementally in series.
*2 If the slot number does not exist in the module No., FFH is stored.
*3 When FFFFH is stored in SD6 (I/O No.), it means that the I/O No. could not be identified in I/O Assignment of PLC Parameter. In this case, the error location is identified in SD5.
2) File name/drive name
<table>
<tr><th>Number</th><th colspan="2">Meaning</th></tr>
<tr><td>SD5</td><td colspan="2">Drive</td></tr>
<tr><td>SD6
SD7
SD8
SD9</td><td colspan="2">File name
(ASCII code: 8 characters)</td></tr>
<tr><td>SD10</td><td>Extension ∗4</td><td>2EH(.)</td></tr>
<tr><td>SD11</td><td colspan="2">(ASCII code: 3 characters)</td></tr>
<tr><td>SD12
SD13
SD14
SD15</td><td colspan="2">(Empty)</td></tr>
</table>
(Example) File name = ABCDEFGH. IJK
<table>
<tr><th>b15 to b8</th><th>b7 to b0</th></tr>
<tr><td>42H(B)</td><td>41H(A)</td></tr>
<tr><td>44H(D)</td><td>43H(C)</td></tr>
<tr><td>46H(F)</td><td>45H(E)</td></tr>
<tr><td>48H(H)</td><td>47H(G)</td></tr>
<tr><td>49H(I)</td><td>2EH(.)</td></tr>
<tr><td>4BH(K)</td><td>4AH(J)</td></tr>
</table>
3) Time (Set value)
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD5</td><td>Time : 1μs units (0 to 999μs)</td></tr>
<tr><td>SD6</td><td>Time : 1ms units (0 to 65535ms)</td></tr>
<tr><td>SD7
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15</td><td>(Empty)</td></tr>
</table>
*4 For the names of extensions, refer to the table below on this page.
</td><td>S
(On error)</td></tr>
</table>

(a) Names of the extensions

The names of the extensions are shown in the table below.

SDn	SD_{n+1}		Extension name	File type
Upper 8 bits	Lower 8 bits	Upper 8 bits		
51H	50H	41H	QPA	Parameter
51H	44H	49H	QDI	Initial device value

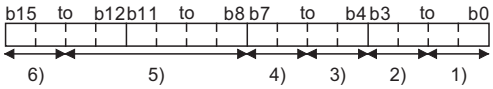
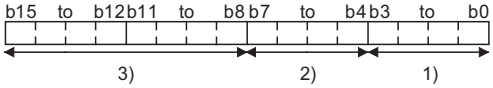
<table>
<tr><th>No.</th><th>Name</th><th>Description</th><th>Details</th><th>Set by (Set timing)</th></tr>
<tr><td>SD16
SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>Individual error information</td><td>Individual error information</td><td>
• Stores individual information corresponding to the error code (SD0).
• There are six types of information that are stored.
• The type of error individual information can be identified by SD4 "individual information category code". (The values of "individual information category code" stored in SD4 correspond to items 1) to 6) below.)
1) (Empty)

2) File name/drive name
<table>
<tr><th>Number</th><th colspan="2">Meaning</th></tr>
<tr><td>SD16</td><td colspan="2">Drive</td></tr>
<tr><td>SD17</td><td colspan="2" rowspan="4">File name
(ASCII code: 8 characters)</td></tr>
<tr><td>SD18</td></tr>
<tr><td>SD19</td></tr>
<tr><td>SD20</td></tr>
<tr><td>SD21</td><td>Extension *4</td><td>2EH(.)</td></tr>
<tr><td>SD22</td><td colspan="2">(ASCII code: 3 characters)</td></tr>
<tr><td>SD23</td><td colspan="2" rowspan="4">(Empty)</td></tr>
<tr><td>SD24</td></tr>
<tr><td>SD25</td></tr>
<tr><td>SD26</td></tr>
</table>
(Example) File name = ABCDEFGH. IJK
<table>
<tr><th>b15 to b8</th><th>b7 to b0</th></tr>
<tr><td>42H(B)</td><td>41H(A)</td></tr>
<tr><td>44H(D)</td><td>43H(C)</td></tr>
<tr><td>46H(F)</td><td>45H(E)</td></tr>
<tr><td>48H(H)</td><td>47H(G)</td></tr>
<tr><td>49H(I)</td><td>2EH(.)</td></tr>
<tr><td>4BH(K)</td><td>4AH(J)</td></tr>
</table>
3) Time (Actual measurement value)
<table>
<tr><th>Number</th><th>Meaning</th></tr>
<tr><td>SD16</td><td>Time : 1μs units (0 to 999μs)</td></tr>
<tr><td>SD17</td><td>Time : 1ms units (0 to 65535ms)</td></tr>
<tr><td>SD18</td><td rowspan="9">(Empty)</td></tr>
<tr><td>SD19</td></tr>
<tr><td>SD20</td></tr>
<tr><td>SD21</td></tr>
<tr><td>SD22</td></tr>
<tr><td>SD23</td></tr>
<tr><td>SD24</td></tr>
<tr><td>SD25</td></tr>
<tr><td>SD26</td></tr>
</table>
*4: For names of extensions, refer to the table on Page 116.

To the 4)
</td><td>S
(On error)</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name</th><th>Description</th><th>Details</th><th>Set by (Set timing)</th></tr>
<tr><td>SD16
SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>Individual error information</td><td>Individual error information</td><td>Continued from the 3)
4) Parameter No.
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD16</td><td>Parameter No. *5</td></tr><tr><td>SD17
SD18
SD19
SD20
SD21
SD22
SD23
SD24
SD25
SD26</td><td>(Empty)</td></tr></table>*5 For details on parameter No., refer to the following.
☞ Page 52, CHAPTER 7
5) Malfunction information
<table><tr><th>Number</th><th>Meaning</th></tr><tr><td>SD16</td><td>Failure information 1</td></tr><tr><td>SD17</td><td>Failure information 2</td></tr><tr><td>SD18</td><td>Failure information 3</td></tr><tr><td>SD19</td><td>Failure information 4</td></tr><tr><td>SD20</td><td>Failure information 5</td></tr><tr><td>SD21</td><td>Failure information 6</td></tr><tr><td>SD22</td><td>Failure information 7</td></tr><tr><td>SD23</td><td>Failure information 8</td></tr><tr><td>SD24</td><td>Failure information 9</td></tr><tr><td>SD25</td><td>Failure information 10</td></tr><tr><td>SD26</td><td>Failure information 11</td></tr></table>6) File diagnostic information
<table><tr><td>SD16</td><td>Failure information 1 (H)</td><td>drive No.(L)</td></tr><tr><td>SD17
SD18
SD19
SD20</td><td colspan="2">File name
(ASCII: 8 characters)</td></tr><tr><td>SD21</td><td>Extension *4</td><td>2EH(.)</td></tr><tr><td>SD22</td><td colspan="2">(ASCII; 3 characters)</td></tr><tr><td>SD23
SD24</td><td colspan="2">Failure information 2
(CRC value that is read)</td></tr><tr><td>SD25
SD26</td><td colspan="2">Failure information 3
(CRC value that is calculated)</td></tr></table>*4 For names of extensions, refer to the table on Page 116.</td><td>S
(On error)</td></tr>
<tr><td>SD50</td><td>Error clear</td><td>Error code to clear</td><td>Stores the error code to clear.</td><td>U</td></tr>
<tr><td>SD53</td><td>AC/DC Down detection</td><td>AC/DC Down detection count</td><td>• Each time the input voltage of the head module drops below 85% (AC power)/65% (DC power) of the rated voltage, the value is incremented by 1 and is stored.
• The counter repeats increment and decrement of the value: 0 → 32767 → -32768 → 0.</td><td rowspan="2">S
(On error)</td></tr>
<tr><td>SD61</td><td>I/O module verify error number</td><td>I/O module verify error module number</td><td>Stores the lowest I/O No. of the module in which the I/O module verify error occurred.</td></tr>
</table>

(2) System information

No.	Name	Description	Details	Set by (Set timing)
SD200	Status of switch	Head module switch status	Stores the switch status of the head module. 0: RUN 1: STOP/RESET	S (Switch change)
SD201	LED status	Head-LED status	• Stores one of the following statuses for the LED of the head module in the following bit pattern. • 0 = Off, 1 = On, 2 = Flashing  1): REM, 2): ERR., 3) Empty, 4) L ERR., 5) Empty, 6) RUN	S (Status change)
SD203	Operating status	Operating status	Stores the operating status of the head module.  1) Operating status 0: RUN, 2: STOP 2) Cause of STOP Stores the latest cause of the change in the operating status. 0: STOP switch 1: Motion controller STOP 2: Remote operation from GX Works2, etc. 4: Error 3) Empty	S (Status change)
SD250	Loaded maximum I/O	Loaded maximum I/O number	Stores the upper 2 digits of the last I/O number of the connected module + 1.	S (Initial)

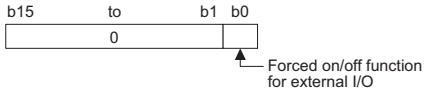
No.	Name	Description	Details	Set by (Set timing)
SD286	Device assignment	Number of points assigned for M (For extension)	This register stores the number of M (for extension) points (fixed to 0).	S (Initial)
SD287				
SD288		Number of points assigned for B (For extension)	This register stores the number of B (for extension) points (fixed to 0).	
SD289				
SD290	Device assignment 1	Number of points assigned for X	This register stores the number of X points (fixed to 8192).	
SD291		Number of points assigned for Y	This register stores the number of Y points (fixed to 8192).	
SD292		Number of points assigned for M	This register stores the number of M points (fixed to 0).	
SD293		Number of points assigned for L	This register stores the number of L points (fixed to 0).	
SD294		Number of points assigned for B	This register stores the number of B points (fixed to 0).	
SD295		Number of points assigned for F	This register stores the number of F points (fixed to 0).	
SD296		Number of points assigned for SB	This register stores the number of SB points (fixed to 8192).	
SD297		Number of points assigned for V	This register stores the number of V points (fixed to 0).	
SD298		Number of points assigned for S	This register stores the number of S points (fixed to 0).	
SD299		Number of points assigned for T	This register stores the number of T points (fixed to 0).	
SD300		Number of points assigned for ST	This register stores the number of ST points (fixed to 0).	
SD301		Number of points assigned for C	This register stores the number of C points (fixed to 0).	
SD302		Number of points assigned for D	This register stores the number of D points (fixed to 0).	
SD303		Number of points assigned for W	This register stores the number of W points (fixed to 8192).	
SD304		Number of points assigned for SW	This register stores the number of SW points (fixed to 8192).	
SD305	Device assignment 1 (Index register)	16-bit modification Number of points assigned for Z	This register stores the number of Z points (fixed to 0).	
SD306	Device assignment 1	Number of points assigned for ZR (Extension)	This register stores the number of ZR (for extension) points (fixed to 0).	
SD307				
SD308	Device assignment 2 (Assignment including the number of points set to the extended data register (D) and extended link register (W))	Number of points assigned for D (Inside and extension)	This register stores the number of D points (including extended data register) (fixed to 0).	
SD309				
SD310		Number of points assigned for W (Inside and extension)	This register stores the number of W points (including extended link register) (fixed to 8192).	
SD311				

(3) Drive information

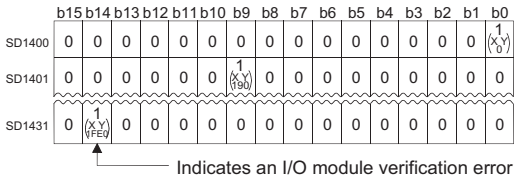
No.	Name	Description	Details	Set by (Set timing)
SD681	Parameter memory write (transfer) status	Write (transfer) status display (percent)	Stores the progress of writing (transferring) to the parameter memory (flash ROM) in percentage (0 to 100%). "0" is set when the write (transfer) command is issued.	S (Write)
SD682	Parameter memory write count index	Write count index up to the present	Stores the index value of write count of the program memory (flash ROM)*1 up to the present in 32-bit binary. When the index value exceeds 100 thousand times, "FLASH ROM ERROR" (error code: 1610) occurs. (The index value will continue to be counted even after it exceeds 100 thousand.)	
SD683				

*1 The write count is not equal to the index value. (Since the maximum write count of the flash ROM has been increased by the system, the value increments by 1 about every two write operations.)

(4) Debug

No.	Name	Description	Details	Set by (Set timing)
SD840	Debug function usage	Debug function usage status	Stores the usage status of the following debug functions. 0: External input/output forced on/off function 1 to 15: Empty (fixed at 0)  (0: Not used 1: Used)	S (Status change)

(5) I/O module verification

No.	Name	Description	Details	Set by (Set timing)
SD1400 to SD1431	I/O module verify error	Bit pattern, in units of 16 points, indicating the modules with verification errors 0: No I/O verification errors 1: I/O verification error exists	• If the status of the I/O module changes from that obtained at power-on, the module No. is stored in the following bit pattern. (If the I/O numbers are set by parameter, the parameter-set numbers are stored.)  When the number of I/O points of the module exceeds 16 points, all bits corresponding to the I/O module number (in units of 16 points) that is included in the number of I/O points occupied by the module turn on. Ex. When a 64-point module is connected on the slot 0, b0 to b3 are turned on by error detection. • Not cleared even if the normal state is restored. This flag is cleared by the error resetting operation.	S (On error)

Memo

Appendix 8 EMC and Low Voltage Directives

Compliance to the EMC Directive, which is one of the EU Directives, has been a legal obligation for the products sold in European countries since 1996 as well as the Low Voltage Directive since 1997.
Manufacturers who recognize their products are compliant to the EMC and Low Voltage Directives are required to attach a "CE mark" on their products.

(1) Authorized representative in Europe

Authorized representative in Europe is shown below.
Name: Mitsubishi Electric Europe BV
Address: Gothaer Strasse 8, 40880 Ratingen, Germany

Appendix 8.1 Requirements for compliance with the EMC Directive

The EMC Directive specifies that "products placed on the market must be so constructed that they do not cause excessive electromagnetic interference (emissions) and are not unduly affected by electromagnetic interference (immunity)".
This section summarizes the precautions on compliance with the EMC Directive of the machinery constructed with the MELSEC-L series modules.
These precautions are based on the requirements and the standards of the regulation, however, it does not guarantee that the entire machinery constructed according to the descriptions will comply with above-mentioned directives.
The method and judgement for complying with the EMC Directive must be determined by the person who constructs the entire machinery.

(1) Standards relevant to the EMC Directive

(a) Regulations regarding emission

Specification	Test item	Test details	Standard value
EN61131-2: 2007	CISPR16-2-3 Radiated emission*2	Radio waves from the product are measured.	• 30M-230MHz QP: 40dBμV/m (10m in measurement range)*1 • 230M-1000MHz QP: 47dBμV/m (10m in measurement range)
	CISPR16-2-1, CISPR16-1-2 Conducted emission*2	Noise from the product to the power line is measured.	• 150k-500kHz QP: 79dB, Mean: 66dB*1 • 500k-30MHz QP: 73dB, Mean: 60dB

*1 QP: Quasi-peak value, Mean: Average value
*2 Programmable controllers are open-type devices (devices designed to be housed inside other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel, applying the maximum applicable input voltage to the power supply module.

(b) Regulations regarding immunity

Specification	Test item	Test details	Standard value
EN61131-2: 2007	EN61000-4-2 Electrostatic discharge immunity*1	Immunity test in which electrostatic is applied to the cabinet of the equipment	• 8kV Air discharge • 4kV Contact discharge
	EN61000-4-3 Radiated, radio-frequency, electromagnetic field immunity*1	Immunity test in which electric fields are irradiated to the product	80% AM modulation@1kHz • 80M-1000MHz: 10V/m • 1.4G-2.0GHz: 3V/m • 2.0G-2.7GHz: 1V/m
	EN61000-4-4 Electrical fast transient/burst immunity*1	Immunity test in which burst noise is applied to the power line and signal line	• AC/DC main power, I/O power, AC I/O (unshielded): 2kV • DC I/O, analog, communication: 1kV
	EN61000-4-5 Surge immunity*1	Immunity test in which lightning surge is applied to the power line and signal line	• AC power line, AC I/O power, AC I/O (unshielded): 2kV CM, 1kV DM • DC power line, DC I/O power: 0.5kV CM, DM • DC I/O, AC I/O (shielded), analog*2, communication: 1kV CM
	EN61000-4-6 Immunity to conducted disturbances, induced by radio-frequency fields*1	Immunity test in which high frequency noise is applied to the power line and signal line	0.15M-80MHz, 80% AM modulation @1kHz, 10Vrms
	EN61000-4-8 Power-frequency magnetic field immunity*1	Immunity test in which the product is installed in inductive magnetic field	50Hz/60Hz, 30A/m
	EN61000-4-11 Voltage dips and interruption immunity*1	Immunity test in which power supply voltage is momentarily interrupted	• Apply at 0%, 0.5 cycles and zero-cross point • 0%, 250/300 cycles (50/60Hz) • 40%, 10/12 cycles (50/60Hz) • 70%, 25/30 cycles (50/60Hz)

*1 Programmable controllers are open-type devices (devices designed to be housed inside other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel.

*2 The accuracy of an analog-digital converter module may temporary vary within ±10%.

(2) Installation inside a control panel

The programmable controllers are open type devices and must be installed inside a control panel.
This ensures safety as well as effective shielding of programmable controller-generated electromagnetic noise.

(a) Control panel

- Use a conductive control panel.
- When securing the top or bottom plate using bolts, cover the grounding part on the control panel so that the part will not be painted.
- To ensure electrical contact between the inner plate and control panel, take measures such as covering the bolts so that conductivity can be ensured in the largest possible area.
- Ground the control panel with a thick ground cable so that low impedance can be ensured even at high frequencies.
- Holes in the control panel must be 10cm diameter or less. If the holes are larger than 10cm, radio wave may be emitted. In addition, because radio waves leak through a clearance between the control panel and its door, reduce the clearance as much as possible. The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.

Our tests have been carried out on a panel having the attenuation characteristics of 37dB (max.) and 30dB (mean) (measured by 3m method, 30 to 300MHz).

(b) Wiring of power cables and ground cables

- Provide a ground point near the power supply module. Ground the LG and FG terminals of the power supply module with the thickest and shortest ground cable (30cm or shorter) possible.

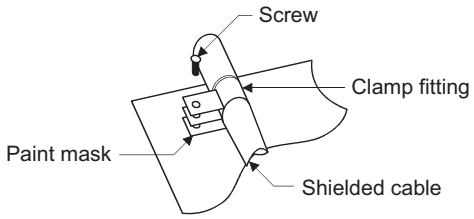
(3) Cables used for the modules connected to the head module

Use shielded cables for the cables which are connected to the I/O modules and may be extended out of the control panel.

If a shielded cable is not used or not grounded correctly, the noise immunity will not meet the specified value.

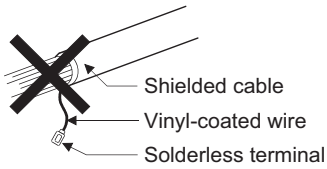
(a) Grounding the shield of the shielded cable

- Ground the shield of the shielded cable as close to the module as possible so that the grounded cable will not be affected by electromagnetic induction from ungrounded cables.
- Ground the exposed shield section to large area on the control panel. A clamp fitting can be used as shown in below. In this case, apply a cover on the painted inner wall surface of the control panel, which comes in contact with the fitting, so that the surface is not painted.



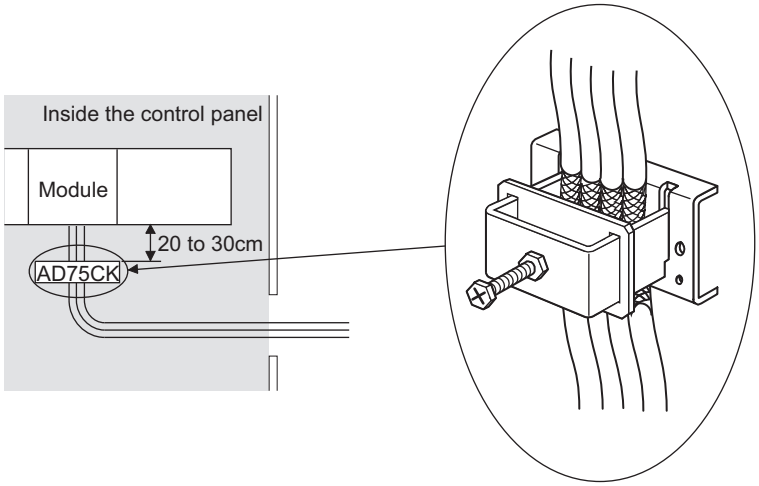
Point

- Grounding with a vinyl-coated wire soldered onto the shielded section of the shielded cable as shown below is not recommended. Doing so will raise the high-frequency impedance, resulting in loss of the shielding effect.



(b) Grounding the cable clamp

Use shielded cables for external wiring and ground the shields of the external wiring cables to the control panel with the AD75CK-type cable clamping (Mitsubishi). (Ground the shield section 20 to 30cm away from the module.)



For details of the AD75CK, refer to the following.

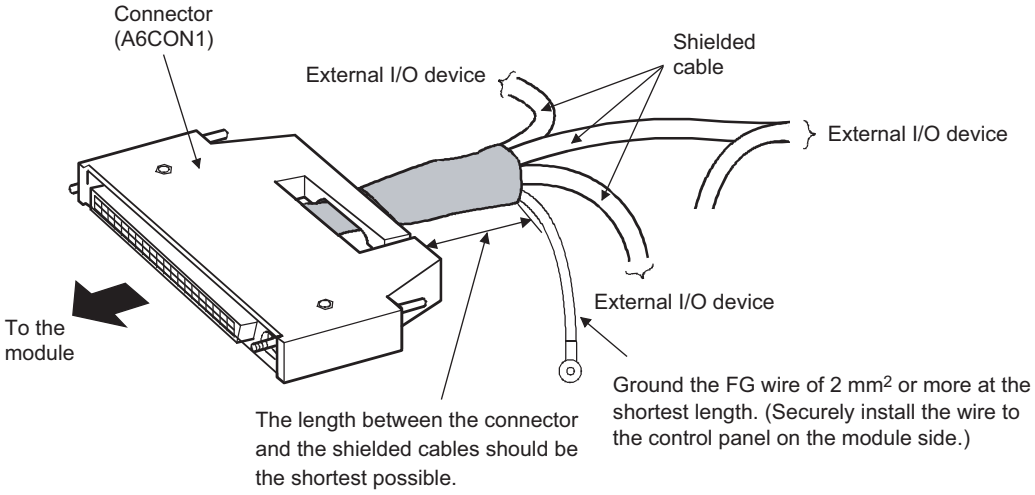
📖 AD75CK-type Cable Clamping Instruction Manual

(c) Connectors for external devices

When using connectors for external devices with the high-speed counter module, take the noise reduction measures described below.

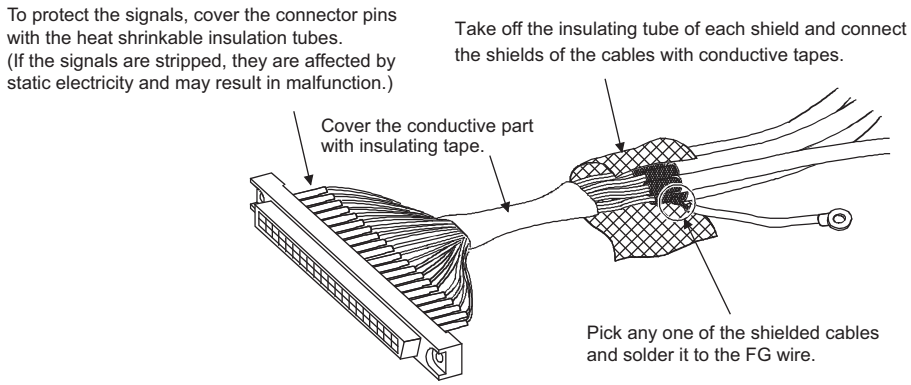
[Wiring example when using shielded cables]

The following figure shows the example of wiring using A6CON1 for noise reduction.

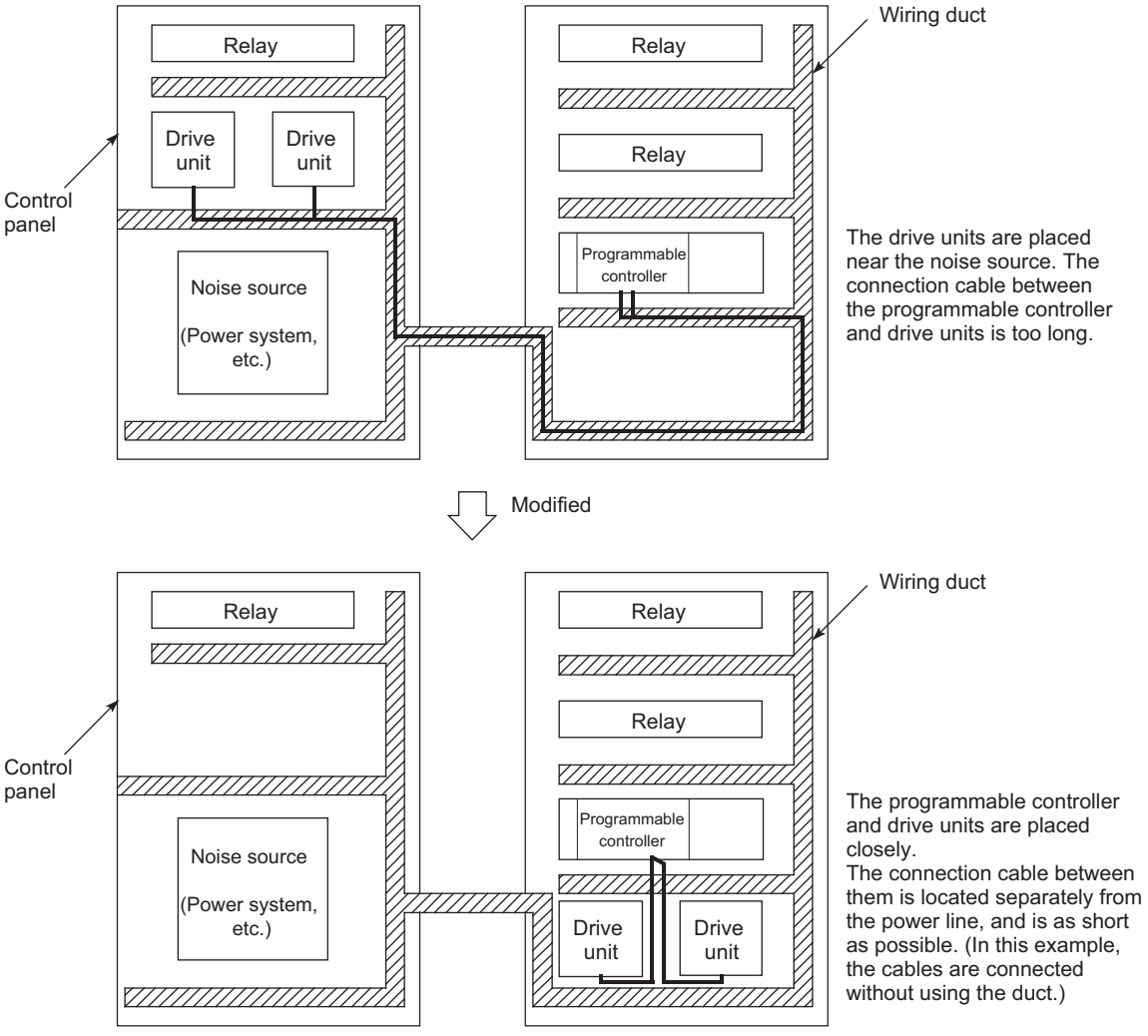

Connector
(A6CON1)
External I/O device
Shielded
cable
External I/O device
External I/O device
To the
module
Ground the FG wire of 2 mm2 or more at the shortest length. (Securely install the wire to the control panel on the module side.)
The length between the connector and the shielded cables should be the shortest possible.

A

[Example of processing for a shielded cable]


To protect the signals, cover the connector pins with the heat shrinkable insulation tubes. (If the signals are stripped, they are affected by static electricity and may result in malfunction.)
Take off the insulating tube of each shield and connect the shields of the cables with conductive tapes.
Cover the conductive part with insulating tape.
Pick any one of the shielded cables and solder it to the FG wire.

[Wiring example when using a duct (Example of a problem and its solution)]


Relay
Drive unit
Drive unit
Control panel
Noise source
(Power system, etc.)
Relay
Relay
Programmable controller
Wiring duct
The drive units are placed near the noise source. The connection cable between the programmable controller and drive units is too long.
Modified
Relay
Control panel
Noise source
(Power system, etc.)
Relay
Relay
Programmable controller
Drive unit
Drive unit
Wiring duct
The programmable controller and drive units are placed closely.
The connection cable between them is located separately from the power line, and is as short as possible. (In this example, the cables are connected without using the duct.)

(d) I/O signal lines and other communication cables

For the following cables, if pulled out of the control panel, always ground the shield section of these lines and cables in the same manner described in (a).

- I/O signal lines (including a common line)

(e) Power cables for external power supply terminal

As an external power supply for the following modules, use a CE-marked AC/DC power supply with a reinforced insulation or a double insulation. Install the AC-DC power supply in the control panel where the module is installed. Keep the length of the power cable connected to the external power supply terminal to 30m or less.

- Analog-digital converter module
- Digital-analog converter module
- High-speed counter module

(4) External power supply

Use a CE-marked external power supply with a reinforced insulation or a double insulation and ground the FG terminals.

(External power supply used for the tests conducted by Mitsubishi: TDK-Lambda DLP-120-24-1, IDEC PS5R-SF24)

(5) Power supply module

- Always ground the LG and FG terminals after shunting them.
- Use a CE-marked external power supply with a reinforced insulation or a double insulation to supply 24VDC to the L63SP.

(6) I/O modules

- Install the DC power in the same control panel with the modules.
- When a cable for the DC power is installed extending outside the control panel, use a shielded cable.
- A cable for the DC power must be 30m or less in length.
- When the number of relay operations is more than 5 times per minute, take measures such as using a surge suppressor.

(7) High-speed counter module

- Install the DC power in the same control panel with the modules.
- When a cable for the DC power is installed extending outside the control panel, use a shielded cable.
- Keep the length of cables connected to external devices to 30m or less.

(8) Others

(a) Ferrite core

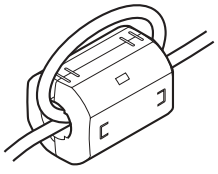
A ferrite core has the effect of reducing radiated noise in the 30MHz to 100MHz band.

It is recommended to attach ferrite cores if shield cables coming out from pulled out of the control panel do not provide sufficient shielding effects.

Note that the ferrite cores must be attached at the position closest to the cable hole inside the control panel. If attached at an improper position, the ferrite core will not produce any effect.

Attach a ferrite core to each power line as illustrated below.

Example

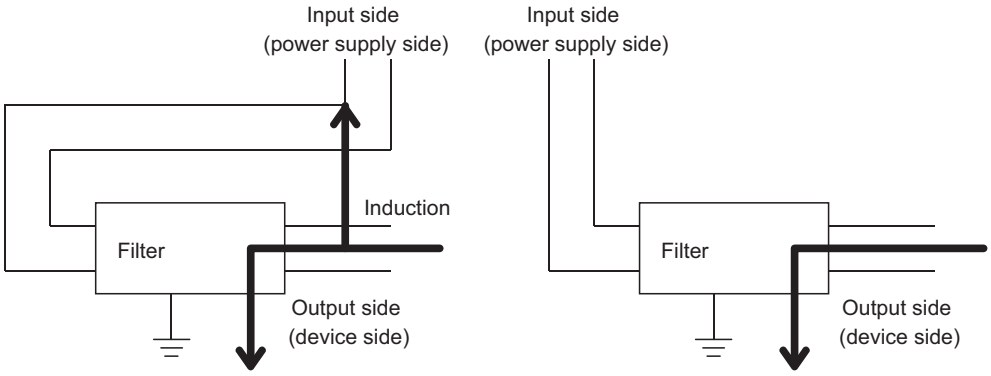


(b) Noise filter (power supply line filter)

A noise filter is a component which has an effect on conducted noise. Attaching the filter can suppress more noise. (The noise filter has the effect of reducing conducted noise of 10 MHz or less.)

The precautions for attaching a noise filter are described below.

- Do not bundle the cables on the input side and output side of the noise filter. If bundled, the output side noise will be induced into the input side cables from which the noise was filtered.



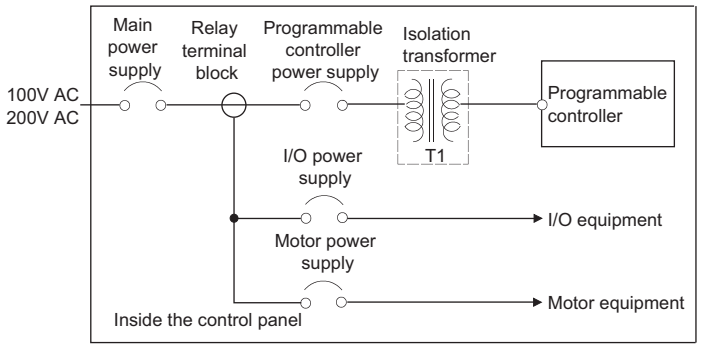
Noise will be induced when the input and output wires are bundled.

Separately install the input and output wires.

- Ground the noise filter grounding terminal to the control panel with the shortest cable possible (approx. 10cm).

(c) Isolation transformer

An isolation transformer has an effect on reducing conducted noise (especially, lightning surge). Lightning surge may cause a malfunction of the programmable controller. As measures against lightning surge noise, connect an isolation transformer as shown below. Using an isolation transformer will reduce an impact of lightning.



Appendix 8.2 Requirements for compliance with the Low Voltage Directive

The Low Voltage Directive requires each device that operates with the power supply ranging from 50 to 1000VAC and 75 to 1500VDC to satisfy the safety requirements.
This section summarizes precautions on using the MELSEC-L series modules to comply with the Low Voltage Directive.
These descriptions are based on the requirements and standards of the regulation; however, it does not guarantee that the entire machinery manufactured based on the descriptions complies with the Low Voltage Directive. The method and judgment for the Low Voltage Directive must be left at manufacturer's own discretion.

(1) Standard applied for MELSEC-L series modules

- EN61010-1 Safety of equipment used in measurements, controls, or laboratories.

The MELSEC-L series modules with a rated voltage of 50VAC and 75VDC or higher have been also developed to conform to the above standard.
The modules which operate at the rated voltage of less than 50VAC and 75VDC are out of the Low Voltage Directive application range.
For CE-marked products, please consult your local Mitsubishi representative.

(2) MELSEC-L series module selection

(a) Power supply module

There are dangerous voltages (voltages higher than or equal to 42.4V peak) inside the power supply modules of 100VAC and 200VAC rated input voltages. Therefore, for CE-marked products, insulation is reinforced internally between the primary and secondary circuits.

(b) I/O modules

There are dangerous voltages (voltages higher than or equal to 42.4V peak) in the I/O modules of 100VAC and 200VAC rated I/O voltages. Therefore, for CE-marked products, insulation is reinforced internally between the primary and secondary circuits.
The I/O modules of 24VDC or less rating are out of the Low Voltage Directive application range.

(c) Modules not relevant to the Low and Voltage Directive

Using 5VDC circuit inside, the following modules are out of the Low Voltage Directive application range.

- Head module
- END cover

The intelligent function modules are out of the scope of the Low Voltage Directive because the rated voltage is 24VDC or less.

(3) Power supply

The insulation specification of the power supply module was designed assuming Installation Category II.
Satisfy the Installation Category II for the power supply to the programmable controller.

(4) Control panel

(a) Electrical shock prevention

The control panel must be handled as shown below to protect a person who does not have adequate knowledge of electricity from an electric shock.

- Lock the control panel so that only those who are trained and have acquired enough knowledge of electric facilities can open the control panel.
- The control panel must have a structure that automatically stops the power supply when the control panel is opened.
- Use the control panel whose protection degree is IP20 or higher for the purpose of electric shock protection.

(b) Dustproof and waterproof features

The control panel also has the dustproof and waterproof functions.

Insufficient dustproof and waterproof features lower the dielectric withstand voltage, resulting in insulation destruction.

The insulation in our programmable controllers are designed to cope with the pollution level 2, so use it in an environment with pollution level 2 or below. The pollution level 2 environments can be achieved when the programmable controller is stored in a control panel equivalent to IP54.

(5) Grounding

There are the following two different ground terminals.

Use the ground terminals in grounded status.

Terminal	Application
Protective grounding ⏚	Ensures the safety of the programmable controller and improves the noise resistance.
Functional grounding ⏚	Improves the noise resistance.

(6) External wiring

(a) 24VDC external power supply

For the 24VDC I/O modules and intelligent function modules requiring an external power supply, use a 24VDC-circuit whose insulation is reinforced from the hazardous voltage circuit.

(b) External devices

When a device with hazardous voltage circuit is externally connected to the programmable controller, use a device whose circuit section of the interface to the programmable controller is intensively insulated from the hazardous voltage circuit.

(c) Reinforced insulation

The reinforced insulation covers the withstand voltages shown below.

Rated voltage of hazardous voltage area	Surge withstand voltage (1.2/50μs)
150VAC or lower	2500V
300VAC or lower	4000V

(Installation Category II, source: IEC 664)

Appendix 9 General Safety Requirements

When a programmable controller is powered on or off, proper output of the control target may not function temporarily due to delay and startup time differences between the power supply for the programmable controller and the external power supply for the control target (especially in the case of DC). Also, an abnormal operation may occur if an external power supply or the programmable controller fails.
From the point of view of fail-safe circuit and to prevent any of these abnormal operations from leading to a total network system failure, configure external fail-safe circuits (an emergency stop circuit, protection circuit, and interlock circuit) in the areas where incorrect operation can result in mechanical damage or accidents.

(1) Fail-safe measures against failure of head module

The self-diagnostic function can detect failure of the head module. However, if an error occurs in an area such as I/O control part, the head module may not detect failure.
In this case, all points may turn on or off depending on the failure, and normal operation and safety cannot be ensured.
Although Mitsubishi programmable controllers are manufactured under strict quality control, it is recommended to configure external fail-safe circuits to prevent mechanical damage or accidents due to failure of the programmable controller.

Memo

Appendix 10 Calculating Heating Value of Programmable Controller

The ambient temperature inside the control panel where a head module is installed must be 55℃ or less.
It is necessary to know the average power consumption (heating value) of the equipment and devices installed inside the control panel when designing a heat release structure of the panel.
This section describes the calculation method of the average power consumption of a programmable controller system.
Calculate a rise in ambient temperature inside the control panel according to the power consumption.

Appendix 10.1 Calculating the average power consumption

The total of the power consumption calculated for each block is the power consumption of the entire programmable controller system.

$$W = W_{PW} + W_{5V} + W_{24V} + W_{OUT} + W_{IN} + W_S \ (W)$$

Calculate a heating value and a rise in ambient temperature inside the control panel according to the calculated power consumption (W). The calculation formula for a rise in ambient temperature inside the control panel is as follows.

$$T=\frac{W}{UA}[℃]$$

W: Power consumption of the entire programmable controller system

A: Surface area inside the control panel [m^2]

U (=6): When the ambient temperature inside the control panel is uniformed using a fan

U (=4): When the air inside the control panel is not circulated

Point

- If the temperature inside the control panel is expected to exceed the specified range, it is recommended to install a heat exchanger to the panel to lower the temperature.
- If a general-purpose fan is used, dust will be sucked into the control panel with the external air. This may affect the performance of the programmable controller.

The calculation formulas for the power consumption of each block are as follows.

(1) Power consumption of power supply module

The power conversion efficiency of the power supply module is approximately 70% and 30% of the output power is consumed as heat.
As a result, 3/7 of the output power will be the power consumption.

$$W_{PW} = \frac{3}{7} \times \{ \ (I_{5V} \times 5) \ + \ (I_{24V} \times 24) \ \}(W)$$

I_{5V}: Current consumption of 5VDC circuit of each module

I_{24V}: Average current consumption of 24VDC power supply for internal consumption of the output module (power consumption for the output points simultaneously turned on)*1

*1 Not applicable for the power supply module which does not have the 24VDC power output. (Power (24VDC) is externally supplied.)

(2) Power consumption of 5VDC logic circuit sections in all modules (including the head module)

The power consumption of the 5VDC output circuit in the power supply module is the power consumption of each module.

$W_{5V} = I5_V \times 5$ (W)

(3) Total of 24VDC average power consumption of the output modules (power consumption for the output points simultaneously turned on)

The average power of the 24VDC external power supply is the total power consumption of each module.

$W_{24V} = I_{24V} \times 24 \times$ Simultaneous on rate (W)

(4) Voltage drop in the output section of the output module (power consumption for the output points simultaneously turned on)

$W_{OUT} = I_{OUT} \times V_{drop} \times$ output points $\times$ Simultaneous on rate (W)

I_{OUT}: Output current (current in actual use) (A)

V_{drop}: Voltage drop of each output module (V)

(5) Average power consumption of input section in the input module (power consumption for the input points simultaneously turned on)

$W_{IN} = I_{IN} \times E \times$ Input points $\times$ Simultaneous on rate (W)

I_{IN}: Input current (effective value for AC) (A)

E: Input voltage (voltage in actual use) (V)

(6) Power consumption of the external power supply section to the load(s) connected to the intelligent function module

$W_S = I_{24V} \times 24$ (W)

Appendix 11 Processing Time

The calculation formula for the I/O response time of the head module is as follows:

Rio = (RX/RY points) × 0.16 + (RWw/RWr points) × 5.5 + 430 + Ka + (response time of the connected module) [μs]

The above formula calculates the average value when the number of RX/RY points is the same as the number of actual I/O points of the module connected to the head module, and an auto refresh of the same number of points as the number of RWw/RWr points was executed.

Rio:	I/O response time of the head module
RX/RY points:	The number of points set for "RX Link Device" and "RY Link Device" of the head module in the system setting of MT Developer2
RWw/RWr points:	The number of points set for "RWw Link Device" and "RWr Link Device" of the head module in the system setting of MT Developer2
Ka:	The value to add when auto refresh of the intelligent function module was performed = 140
Response time of the connected module:	📖 Manual for each module used

Memo

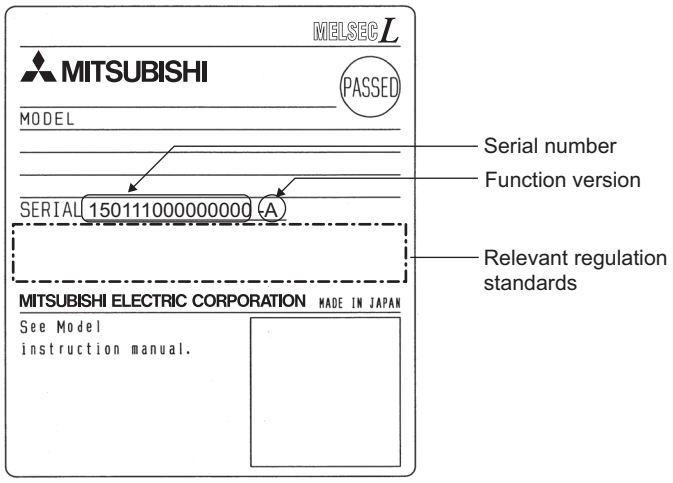
Appendix 12 Checking Serial Number and Function Version

The serial number and function version of the head module can be checked on any of the following:

- Rating plate
- Front of the module
- System Monitor in GX Works2

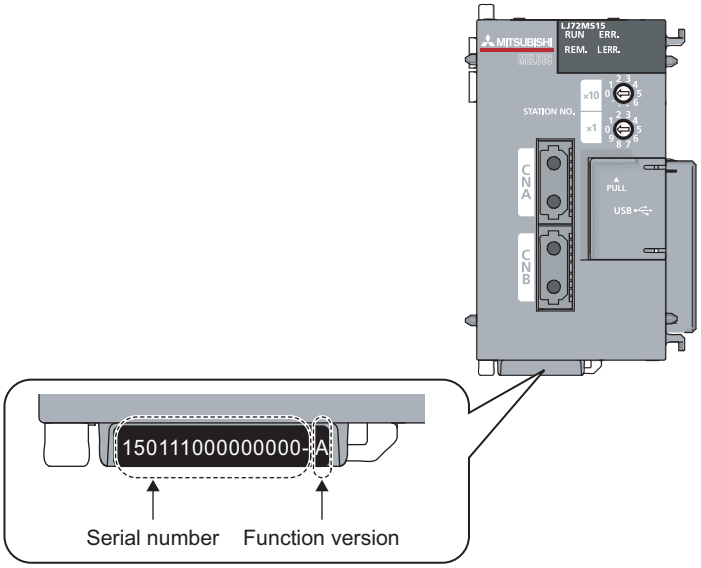
(1) Checking on the rating plate

The rating plate is located on the side of the head module.



(2) Checking on the front of the module

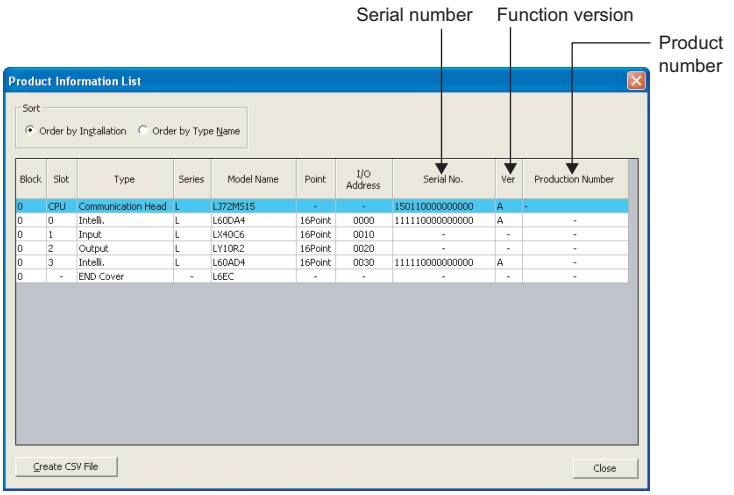
The serial number on the rating plate is printed on the front (at the bottom) of the module.



(3) Checking on the System Monitor window in GX Works2

The serial number and function version can be checked on the "Product Information List" window.

[Diagnostics] ⇨ [System Monitor] ⇨ Product Information List



On the window, the serial number and function version of each intelligent function module can be checked as well.

The serial number of the module is displayed in the "Serial No." column.
The function version of the module is displayed in the "Ver" column.
If the module supports the production number display, the serial number (production number) printed on the rating plate of the module is displayed in the "Production Number" column.

Point

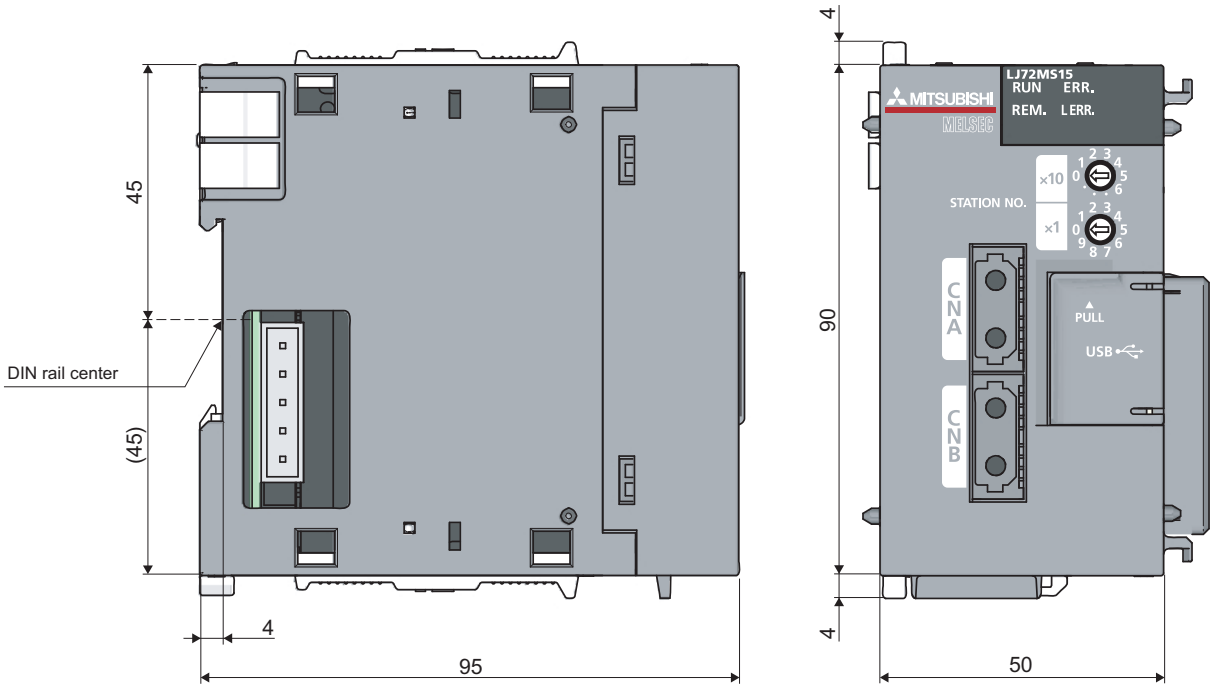
The serial number displayed on the Product Information List window of GX Works2 may differ from that on the rating plate or on the front of the module.

- The serial number on the rating plate or on the front of the module indicates the management information of the product.
- The serial number displayed in the Product Information List of GX Works2 indicates the functional information of the product. The functional information of the product is updated when a new function is added.

Memo

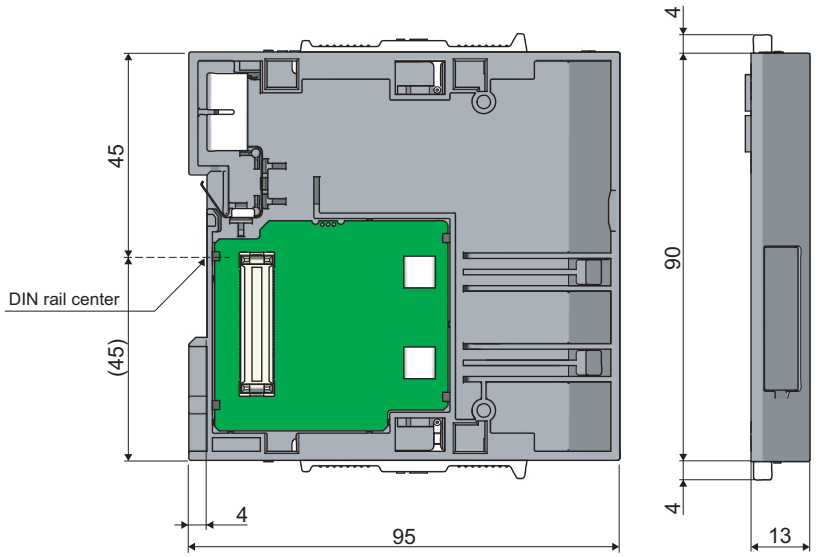
Appendix 13 External Dimensions

(1) Head module (LJ72MS15)



(Unit: mm)

(2) END cover (L6EC)



(Unit: mm)

Memo

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If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

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[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

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2. Failure caused by unapproved modifications, etc., to the product by the user.
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MELSEC-L SSCNETⅢ/H Head Module User's Manual

MODEL	LJ72MS15-U-E
MODEL CODE	13JZ78
SH(NA)-081152ENG-D(1411)MEE	

MITSUBISHI ELECTRIC CORPORATION

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